Electrical Review

THE PIONEER ELECTRICAL WEEKLY OF AMERICA.

VOL. XXXVII. No. 13. NEW YORK, WEDNESDAY, SEPTEMBER 26, 1900. ISSUED WEEKLY.

ELECTRICAL REVIEW

Park Row Building,
13-21 Park Row, New York.
P. O. Box 2339.

CHARLES W. PRICE, Editor.
STEPHEN L. COLES, Managing Editor.
CHARLES T. CHILD, Technical Editor.
STEPHEN H. GODDARD, Advertising Manager.
RUSSELL HOWLAND, Assistant Advertising Manager.

Registered Cable Address:
"Electview," New York.
Telephone Call, 21 "Cortlandt."
(Private branch exchange connecting all departments.)

Western Office:
FRANK E. COLBERT, Representative, 1612-1613 Marquette Building, Chicago.
Washington Office:
GEO. C. MAYNARD, Representative, Room 102 Washington Loan and Trust Building, Washington, D. C.
London Office:
HENRY W. HALL, Representative, 42 Old Broad Street, London, E. C.
News, Subscriptions and Advertisements.

Subscriptions to the
ELECTRICAL REVIEW.
One Year, United States and Canada, - - - $3.00
One Year, Foreign Countries, - - - - - - 5.00
Single Copies, each, - - - - - - - - .10
Copies can be supplied for only one year back at 25 cents each.

THE ELECTROMOBILE.

If anybody had been rash enough fifteen years ago to predict that the bicycle would become a common, ordinary, every-day instrument of business and find an important place in the list of things with which people earn their livings to-day, he would probably have been laughed at. At that time the bicycle was a sporting instrument, simply and solely. The few amateurs who rode it—and it will be remembered that in those days riding a bicycle was a considerable feat—did so solely for the pleasure it afforded them, while perhaps the majority of riders were so-called professionals who rode races for money or gave exhibitions.

The automobile seems to be going through very much such a stage of development. It is to-day, in the United States, for the most part an instrument of pleasure and an accessory of sport—sport of a very high class but none the less truly sport—while the number of automobiles operated for strictly utilitarian purposes is comparatively small. There is no occasion to object to this state of things in the present development of the arts of automobile making and operation. As in the case of the bicycle, the demands of sport will cause the perfection of certain types perhaps more rapidly than the more legitimate demands of business would be able to do. The attempt to secure high speeds will necessarily entail the most careful and accurate study of all of the parts of the automobile. In developing the machine for the racer or for the amateur, important work will be done in making it perfect for the freight carrier, the messenger and the uses of the ordinary citizen.

It seems fair to say that the greatest promise of future usefulness is to-day held out by two types of automobile—those operated by electricity and those using steam as a motive power. The latter class have important advantages of radius of operation and lightness of construction, but with this is coupled the very serious disadvantage of complex construction, disagreeable exhaust and perhaps certain legal restrictions as to operation. The electric vehicle, on the other hand, is exceedingly simple and perfect in its regulation and docile in its habits, but its radius of operation is small and its weight and cost are at present necessarily high. Notwithstanding these drawbacks, it has made for itself a place and will doubtless hold it in the future as against all competitors. This place is for city use for whatever purpose an automobile is required, whether it be for pleasure-driving in the park or for the transportation of merchandise and packages. The electromobile possesses all of the requirements that are desirable in a machine for use on paved streets and within a limited area and with these are coupled none of the disadvantages inherent in the steam-driven machine. When it comes to a question of touring or of long-distance operation over country roads, then it must be admitted that the steam automobile is much more valuable. The gasoline vehicle will probably continue to be used on the race track, but present indications do not seem to point to its extended use either as an instrument of pleasure or as an accessory of business. It has certain faults which apparently nothing can remedy, among these being danger, bad odor and jerky and unpleasant movement.

It has been claimed over and over again that whenever the conditions absolutely require a new invention the invention is forthcoming. Never before in the history of the electric arts has there been a more insistent demand for anything than there is now for a storage battery of higher capacity per unit of weight; to put it in other words, the light storage battery is urgently needed. It seems curious that the only substance known in all the vast range of elements and compounds which our chemists study, available for building storage batteries, is lead, which combines with excessive weight a weak and unstable mechanical character.

CONCERNING BOOKS.

There are received at this office almost daily requests to supply the name of some book that will give an intelligent layman some idea of electricity in its present applications. To these it is necessary to reply that there is no absolutely good book on the subject, and none that is either reliable or up to date, or that is not written

either above the comprehension of the person of reasonable intelligence who knows nothing of electricity or else in simple language for children—therefore highly unpleasant reading to a grown man who has not time to waste in reading involved descriptions in words of one syllable.

There is a large field for just such a book and it is curious that no one has taken the time to write it. It is true that such a book would be as hard to write as any that could be imagined, but it would bring its author reputation and money as well, and would be, beside, as useful a work as any man having the requisite knowledge could undertake. Of course everyone knows that electricity has grown so fast and the subject has increased in importance and in extent with such rapidity that any book must necessarily be somewhat out of date by the time it has gone though the printing office and bindery. Notwithstanding this, however, there is not at present a single work of appropriate size, and that can be sold at a reasonable price, treating of electricity from the standpoint of the intelligent and busy man of affairs who wants to know something about the subject, either on account of his general interest in it or because he wishes to interest himself financially or otherwise in some electrical undertaking. This is mentioned in order to call the attention of authors to this curious lapse in the literature of electricity and to the urgent necessity for filling it with a work that shall combine simplicity, clearness, common sense and accuracy.

ELECTRIC TRACTION FOR MEDIUM-SIZED CITIES.

The development of electric traction in the United States has been so far along two lines—the one employing overhead conductors on the well-known trolley system and the other using conductors in an open-slot conduit situated between the tracks. Both have achieved extraordinary success and each is thoroughly well adapted for its own peculiar conditions, but the two are separated by a very wide difference in the cost of construction.

It is acknowledged that in the largest cities, such as New York, Chicago and Philadelphia, the trolley must sooner or later disappear and its supporting poles be taken out of the streets. In New York to-day there is no trolley system in operation in the borough of Manhattan, although the borough of Brooklyn is traversed by several hundred miles of tracks with the overhead equipment. Without going into the question of the drawbacks of the overhead system, it is sufficient to say that the pressure of public opinion in the larger and more closely-populated cities has been toward the adoption of some system other than this and the elimination from the streets of wires and poles.

The question of what to install is one that is determined by two factors only; the first is what the opinion of the public and the legislation of the municipal authorities in each case demands, and the second is the question of cost of one system as against another. The underground two-conductor system, such as is used in New York, averages from four to six times the cost per lineal mile of track of the ordinary trolley construction. It is evident, while this carefully worked out and entirely successful system is possible upon crowded thoroughfares where the density of travel is very great, that in other streets and in smaller cities it will not earn a dividend upon its exceedingly great cost of construction. In cities of the second class there is no doubt that the time will soon come when the action of the municipal authorities will require the elimination of the aerial conducting system and when the managers of traction systems will be compelled to look about them for something with which to replace their old equipments. As much as we should like to chronicle a different state of things we are compelled to say that experiments with accumulator cars have not, so far, resulted in commercial and operative success. We must look, then, to the systems intermediate in character between the trolley and the open-slot conduit for the solution of the difficult problem confronting the average electric railway.

Of the numerous systems of sectional rail or closed conduit type that have been invented, only one, so far as we are aware, is in full commercial operation to-day; that is the Diatto system, which has been installed in Paris and is said to be in satisfactory working order. This system differs from others of its class only in details. There is laid in the street a sectional third rail, which, by the passage of the car over it, is connected to a continuous conductor in such a way that only the sections under the car are "alive" at any time. While all of these systems introduce a certain element of complexity in street railway construction, they all share in one highly important advantage over the open-slot system—their comparatively low cost. It seems to an unprejudiced observer of the condition of the art that the field for systems of this kind is large and increasing and that the advent of a thoroughly successful and well-tested system will be followed by its widespread adoption in cities where æsthetics and municipal conditions demand the removal of the trolley wire, and where the revenue from operation is not sufficient to pay the cost of such construction as that in New York and Washington. The problem is one of the most interesting and promising that has ever been presented to inventors, and this may be in part the reason why so many patents for sectional systems have been granted. Like everything else in the operative field of electricity, these systems must go through the trying ordeal of practical test under service conditions before their comparative value can be adjudged with any degree of certainty. There must be many of them that are valuable and it seems a safe prediction that within a few years a large number of railways of this type will be in operation in the cities of from one hundred thousand to a million population in the United States.

One of the opportunities that is offered by electricity to railway managers is that of simultaneously lighting and ventilating their trains by means of electric lights and fans. The art of electric train lighting has now advanced to such a point that it has been demonstrated that electric lighting is both better and less expensive than oil and gas lighting, and infinitely more attractive to passengers. The attention of railway managers should be directed to the great progress lately made in electric train lighting, and to the gain in safety as well as in economy possible through the use of electric lighting systems as compared with the more ancient illuminants still in vogue.

WIRELESS TELEPHONY.*

BY SIR WILLIAM HENRY PREECE, K. C. B.

The first experiments in this direction were made in the month of February, 1894, across Loch Ness, in the Highlands. On that occasion trials were made to determine the laws governing the transmission of Morse signals by my electromagnetic method of wireless telegraphy, which has formed the subject of frequent reports to this section since 1884. Two parallel wires, well earthed, were taken, one on each side of the lake, and arrangements were made by means of which the wires could be systematically shortened, with a view of ascertaining the minimum length necessary to record satisfactory signals. It occurred to Mr. Gavey, who was experimenting, to compare telephonic with telegraphic signals; *i. e.*, to ascertain whether articulate speech could be maintained under the same conditions as Morse signaling. The trials showed that it was then possible to exchange speech across the loch at an average distance of one and one-third miles between the parallel wires, when the length of the wires themselves was reduced to four miles on each side of the water. What led to this train of thought was the fact that, although the volume of a telegraphic current was immensely greater than that of a telephonic current, whenever through want of balance in a loop, disturbance was evident, then telephonic cross talk was also manifest. In other words, a weak telephonic current was apparently as powerful a disturber as a strong telegraphic one.

The sensation created in 1897 by Mr. Marconi's application of Hertzian waves distracted attention from the more practical, simpler and older method. Mr. Evershed and Principal Oliver Lodge had in the meantime much advanced the system by introducing admirable call systems. In 1899 I conducted some careful experiments on the Menai Straits, which determined the fact that the maximum effects are produced when the parallel wires are terminated by earth plates in the sea itself. It became quite evident that the ordinary inductive effects are much enhanced by conductive effects through the water, and that in consequence shorter wires are practical. No special apparatus seems necessary. The ordinary telephonic transmitters and receivers were used. It became desirable to establish communication between the islands, or rocks, known as the Skerries and the mainland of Anglesey, and it was determined to do this by means of wireless telephony. The lighthouse at the Skerries was wanted to be in communication with the coast-guard system at Cemlyn, which is connected with the Post Office system. The bottom of the channel is too rough and the currents too violent for a cable. A wire 750 yards in length was, therefore, erected along the Skerries, and on the mainland one of three and one-half miles from a point opposite the Skerries to

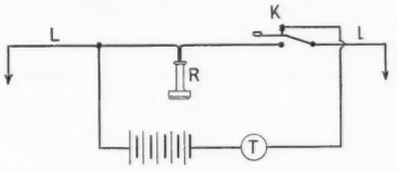


FIG. 1.—DIAGRAM OF CONNECTIONS: LL, LINE WIRE EARTHED AT EITHER END—R, TELEPHONE RECEIVER T, TRANSMITTER—K, A KEY IN SERVICE, WHICH HAS TO BE DEPRESSED WHEN MESSAGE IS BEING RECEIVED.

Cemlyn. Each line terminates by an earthplate in the sea. The average distance between the parallel portions of the two wires is 2.8 miles. Telephonic communication is readily maintained and the service is a good one. Lodge's call system will be used.

Further experiments with wireless telephony have recently been made between Rathlin Island, on the north coast of Ireland, and the mainland. The east and west portion of the island of Rathlin is about eight miles from the mainland, but a tongue of land projects southward to within a distance of four miles. Communication was required between the lighthouse, near the northeastern corner of the island, and the mainland, and the question for solution was whether an overhead line running the whole length of the island from east to west was necessary to obtain good communication, or whether a shorter line across the neck of the southern peninsula would serve. The preliminary experiments that have been made proved conclusively that communication, both telegraphic and telephonic, has been readily maintained by means of temporary wires established across the neck of the peninsula along the shorter line. Wireless telephony across the sea is now a practical and commercial system.

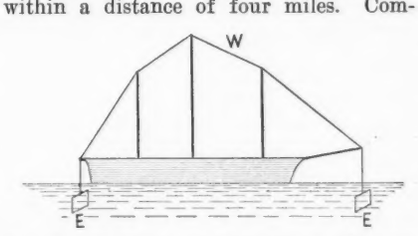


FIG. 2.—W, WIRES OF SENDING AND RECEIVING CIRCUIT—EE, PLATES IN THE SEA.

No experiments have yet been made with ships, but it would appear simple to speak by telephone between ship and ship, or between ship and shore, to considerable distances across space by means of a circuit formed of copper wire terminating at each end of the ship in the sea, passing over the topmast and using simple telephones.

*Paper read before the British Association at Bradford.

Magnetization and Elasticity.

The last of the papers upon "The Effect of Magnetization upon the Modulus of Elasticity," by Mr. J. S. Stevens, appeared in the August number of the *Physical Review*. In the previous papers he discussed the relation between magnetization and the moduli of flexional and torsional elasticity. The two papers in the last issue deal with the elasticity of traction and compression. In the first case the apparatus consisted of a coil of wire wound on a brass tube, through which passed a stream of running water, in which was carried the wire to be tested. One end of the wire was fastened to a rigid support, and the other to a bent lever with a multiplying power of about 11. At the other end of the lever were attached weights giving a certain tension to the wire. The changes in length were communicated to another arm of the same lever, which multiplied the effect 110 times. The fore end of this lever moved under the field of a micrometer microscope. A thermometer with its bulb in the water completed the apparatus. The procedure consisted of setting the cross wires of the microscope on some point for zero, then turning on the current and noting the deflection of the end of the lever. The author then gives tables giving the current, zero readings, difference and the change in length of the wire, says the London *Electrical Engineer*. From the tables he concludes that the modulus of elasticity of traction increases when the body is magnetized. The increase is fairly proportional to the magnetizing force. With the same wire the change in the modulus varied with the stretching weight. With wires of different cross sections stretched by the same load the change in modulus was greater in the smaller wire. In experimenting as to the elasticity of compression, a bar was firmly fastened at one end, and moved a lever arm when changing in length. The other arm of the lever moved under the field of a micrometer microscope. The compressing force was measured by a spring balance. The whole apparatus was bolted rigidly to the bed of a planer, so that there was little chance of friction or slipping. The knife edges and bearings were of hardened steel, and variation of pressure was applied by moving the bed plate of the planer. With respect to this experiment, the author states that within its limits magnetization does not change the elastic modulus for compression. If it had been possible to apply a pressure nearer to that of the elastic limits of the metal, the results might have been different.

MISTAKES IN THE RATING OF INCANDESCENT LAMPS.*

BY PROFESSOR ARTHUR J. ROWLAND.

A 16 candle-power lamp is such a common article of commerce and in such general use that we all recognize it when we see it, or think we do, either by the size of its bulb or the length of the filament, or both. Very few people go beyond such mechanical identification except for the extra assurance they gain by a look at the manufacturer's label. Some, indeed, presume to tell that a lamp is of a given candle-power by looking at the brightness of its filament or by considering the general lighting of a room; but it need scarcely be said that an estimate formed by such a method is utterly worthless, since one is too much influenced by contrasts in brightness, or deceived by the temperature at which a given filament is burned, to really tell anything at all about the candle-power.

The importance of exact knowledge of the candle-power of incandescent lamps is at last being recognized among lamp users generally. One of the signs of this in the present times is the great number of photometers recently set up and used outside of laboratories. Certain standard measurements are made with these, which are good so far as they go, but commonly many important things are quite passed by unnoticed. Not only should the user of incandescent lamps want to know that the lamps he buys really have the candle-power marked on them, and that they maintain their candle-power properly as they grow old in service, but he ought to know and fully understand other things regarding the real candle-power and watts per candle-power of the lamps he uses. Some of these seem to have quite escaped notice, and their importance is so great as to merit careful consideration.

Let us first inquire into just what a 16 candle-power lamp ought to be. That it should be one which gives a light equal to that of 16 candles in the direction in which the light is useful seems a natural and fair definition. A little careful observation of lamps as they are installed shows that at least 85 to 90 per cent of those used are put in place with base upward, or tipped end downward, and it is the light which comes from this tipped end of the lamp which is useful. In cases where the lamp is installed in a different position, either the lamp is subordinated to some artistic feature of the electrolier, or the lamp is installed "side on" to better keep it out of the way. So it comes that the light we ought really to want to know about, the light we ought to measure, is that coming out of the end of the lamp. Or at least it is sure that, if we call the axis of the lamp a line through it from the middle of the base up to the sealed-off tip, the light of value is that coming into space below a plane perpendicular to the axis, half way along its length. We can never use more light than this, since for satisfactory lighting the sources must be above us, and in real service we make use of much less, as will be presently shown. Should we take the average candle-power of all the light rays into space below the imaginary plane just defined, this would be called the mean hemispherical candle-power, just as the average candle-power of all the light rays given by the lamp in every direction is called the mean spherical candle-power.

The placing of lights is to-day being made much more intelligently than by the old rules of so many 16 candle-power lamps per 100 square feet of floor surface, or per 100 cubic feet of room to be lighted. Some certain amount of illumination is now striven for, and a proper distribution of light rather than of lights is sought.

In a great deal of lighting one tries intentionally to give illumination concentrated about particular points. For example, in lighting a library it is the library table which is to be brightly lighted; other parts of the room need little more than the scattered rays otherwise useless, which reach them directly from the light source or after reflection. The light rays in poor planes and the reflected light which comes from the table, the walls and objects in the room, though contributing little to the important light, serve to break up shadows and produce diffusion. Almost the same thing would be true of the lighting of a bedroom, where the light should be concentrated about the bureau or dressing table.

In quite a different sort of lighting, still the same things hold true. Take the lighting of a factory or a mill for example. The light must be on the machines or work, and be very good there. That which gives the room its general lighting is waste light from the light sources. To light the whole room as brightly as the machines would be too costly to be practical. For such lighting let us consider what rays are useful and what rays waste light. If the lamp hangs directly above the thing to be lighted, and its area be not more that five by five feet, no rays of light beyond 30 degrees from the axis of the lamp will be useful, and the higher the lamp is hung, the less the angle in which the useful light is found.

A second sort of lighting is that in which a uniform distribution of light is required, as in concert halls, or auditoriums of various sorts, and in shops for the sale of merchandise. A fundamental principle in this class of lighting is to use many sources of small candle-power each, all so placed that the light from them is directed downward, with perhaps a little diffused side light to break up the shadows, especially in small interiors. The lighting engineer is forced to use single lamps to procure this, except in large rooms and they are nearly always installed base upward. The light from the tipped end produces the light of value.

A third sort of lighting is for decorative purposes, but that is so very especial and foreign to considerations of candle-power at all in most instances as to merit no consideration here.

The light below the lamp—that from the tipped end—is then the important and useful light in all practical cases. This is true, too, not only from the specific cases cited, but where large electroliers with many lights are used as well; for in such cases the lamps are usually flared out with axes at some angle approaching 45 degrees, in which case high candle-power from the tipped end and low from the sides of the lamp would contribute to a good even illumination of the room.

The importance of procuring high candle-power below the lamp has been recognized a long time. But what expensive and roundabout methods have been taken to procure it! It is very common to use reflectors to increase the amount of light in the direction below the lamps. While reflectors have their place in lighting, and an important one, too, for most purposes they are exceedingly poor and are used in ignorance of the effects they produce or because no better device for light redistribution can be had. No matter whether it is of porcelain, a glass mirror, or a polished metal surface, it inevitably cuts the light off absolutely in some directions and so directs it in others as to produce sharp shadows and brilliant lighting contrasts. In satisfactory lighting contrasts of light and shade are always avoided, and by producing diffusion most shadows are lost. Other devices, like McCreary shades and specially shaped incandescent lamps having a reflector incorporated with the lamp, have faults precisely the same as reflectors. Holophanes, with their prismatic and accurately formed surfaces, turn the light downward and at the same time diffuse it by refraction, so that on all artificial lights the distribution of the light, and the lighting therefore, is improved by their use. A holophane gives a redistribution of light immeasurably better than a reflector always. If an incandescent lamp is installed base down, holophanes or reflectors must be used on it or the lamp will be valueless in supplying really useful light.

The common use of such devices is evidence that the ordinary incandescent lamp does not give as much light below it as is required there. Is there, then, a bad light distribution from them? An examination of modern lamps will tell us.

(*To be continued.*)

*Read before the Franklin Institute, Philadelphia, September 19, 1900.

THE INTERNATIONAL AUTOMOBILE EXHIBITION AND RACE MEET AT CHICAGO.

FULL ACCOUNT OF THE INTERESTING GATHERING OF AUTOMOBILES UNDER THE AUSPICES OF THE CHICAGO "INTER-OCEAN."

BY FRANK E. COLBERT.

The International Automobile Exhibition and Race Meet, given under the auspices of the Chicago *Inter-Ocean,* at the Washington Park Club Grounds, Chicago, was opened Tuesday, September 18, and continued for the rest of the week.

There was some reason to regret the delay of exhibitors in preparing their exhibits, as on the opening day, there was still a good deal of work going on in the various booths and exhibits were hardly in proper shape before Wednesday morning. Owing to threatening and cold weather the attendance on Tuesday was small. The race events on the first day were nine in number, and included a 10-mile race, free for all vehicles, and a one-mile race for electric vehicles alone. In the latter event the only entrant was Mr. C. A. Lindstrom, who went over the course in a Hewitt-Lindstrom runabout in the excellent time of 2.34. The 10-mile race was a very close one between Messrs. Alexander Winton, in an American-made gasoline vehicle, and Mr. Kenneth A. Skinner, mounted on a French De Dion tricycle. There were six other starters in the race, but these were hopelessly distanced before the 10 miles were out. Mr. Winton won in the exceedingly good time of 16.02 for the 10 miles, the race being very close at all times and the finish very exciting—the two machines overlapping one another when they crossed under the wire.

FIG. 1.—START OF THE TWENTY-MILE RACE AT THE CHICAGO AUTOMOBILE EXHIBITION AND RACE MEET.

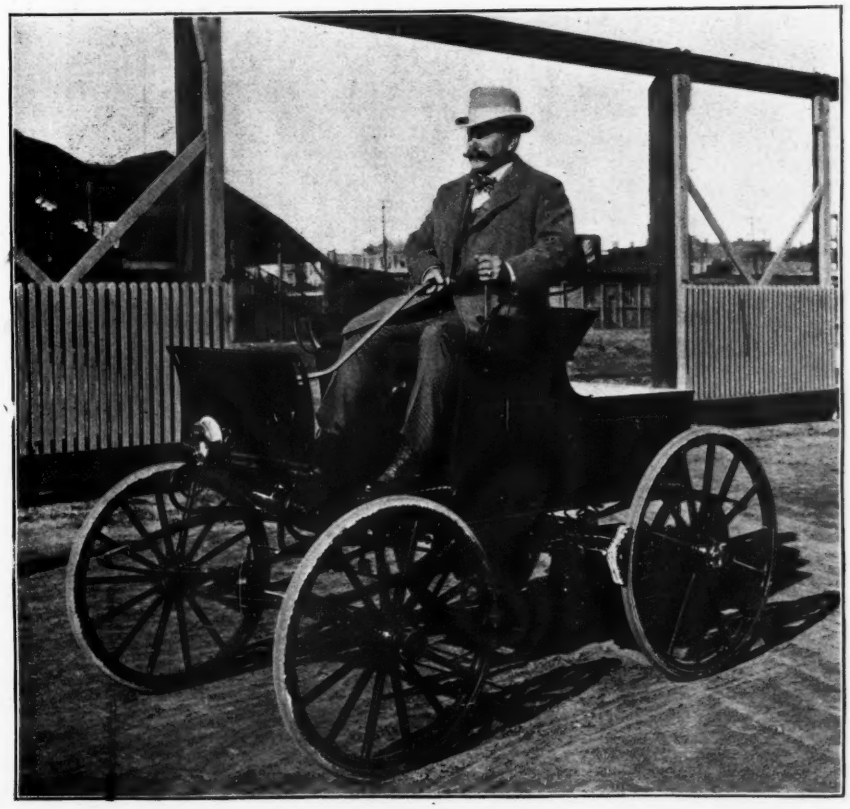


FIG. 2.—ELECTROMOBILE RUNABOUT WHICH MADE A MILE IN 2.34 AT THE CHICAGO AUTOMOBILE EXHIBITION AND RACE MEET.

The parade for private owners, in which the prize of a gold medal was offered for the most elegant turnout, and a gold medal for the automobile carrying the greatest number of seated passengers, was easily won by Mr. Lindstrom, with a Hewitt-Lindstrom omnibus loaded to the guards with passengers. Over 30 passengers were on the vehicle. Mr. J. Wesley Allison secured second prize.

During the afternoon of Tuesday, Mr. T. E. Griffin drove an exhibition mile in his racing steam automobile, making the exceedingly good time of 1.06. This is said to be no indication of the limit of the speed of the machine, as the track, which is an excellent trotting track in good condition that day, was not banked sufficiently at the turns to permit the heavy automobiles to put forth their best speeds in rounding them; at the same time there was a stiff wind blowing while Mr. Griffin was giving his exhibition.

On Wednesday, the second day of the meeting, it was clouded and threatening and as it had rained all night the night before it made it impossible to run any of the track events.

Thursday was, in a way, a field day at Washington Park. The attendance was over 4,000 and the programme was exceedingly interesting. One of the most interesting exhibits was that made by Mr. Jack Worth, who did "stunts" with a steam automobile of the Chicago Motor Vehicle Company's make. Among other things that he did was to play see-saw on a teetering platform 10 feet high, run over boxes 12 inches high, run up at great speed to eggs laid on the concrete path and stop so as just to crack them, etc.

The first race of the day was between

steam vehicles and was won by Dr. L. D. Shepard, of the Chicago Automobile Club, in 2.55½. Another highly interesting contest was the mail-collecting race. Forty post-boxes were erected in such a way as to require a journey of 10 miles on the part of the collecting wagons and mail had to be collected from each, the driver being required to register his name on a card placed in the box, return the card and lock the box and then go on to the next box. While a handicap of six minutes had been put against the Siegel-Cooper & Company deliver wagon, it won the race easily in 46 minutes. The next race was a motor tricycle race and was won by M. Albert Champion, on an American machine, in 24.27 for 15 miles. The time was considered remarkable considering the condition of the track.

One of the most interesting events in Friday's racing was the contest between two electric vehicles operated by ladies. The competitors were Miss Janet Lindstrom, the daughter of C. A. Lindstrom, in a Hewitt-Lindstrom carriage, and Miss M. A. Ryan, in a Woods vehicle. Miss Lindstrom, who is only 13 years old, easily carried away the gold medal, winning the first mile in 1.57 and the second in 1.59¾.

The other races of Friday consisted of a handicap race for a silver cup for high-speed four-wheel vehicles, and was won by Mr. Alexander Winton, who made the 20 miles in 30.31 1-5. A curious event was a backward race in locomobiles. This was won by Mr. T. E. Griffen in the good time of 2.56 3-5. In the five-mile race for the members of the Chicago Automobile Club, no racing vehicles being permitted, Mr. J. W. Bate was first and Mr. C. A. Lindstrom second.

The programme for Saturday included a number of interesting events, among them being 10-mile races for each of the various types of automobiles and a special race at two miles between the two ladies who contested Friday. Miss Ryan, the loser of Friday's race, complained that the batteries of her vehicle had not been fully charged and on this account it was decided to hold the race over again. Two other contests of considerable interest were arranged for Saturday, one being a novelty design contest for automobiles departing radically from the carriage type, and the other for the most original conception in automobiles that is still practical and acceptable.

On Friday evening the Chicago Automobile Club gave a reception to the members of other automobile clubs in attendance at the exhibition.

The following officials were selected for the contests:

Technological Committee: William D. Ray, chairman and special expert for the *Inter-Ocean;* H. M. Brinkerhoff, general manager of the Chicago Metropolitan Elevated Railroad; M. L. Summers, M. E., E. E.; Henry R. Pierce, M. E., E. E.; Professor C. V. Kerr, chair of Technology and Mechanical Engineering of Armour Institute; Professor Henry Crew, chair of Mechanical Engineering of Northwestern University; Professor Paul Mellen Chamberlain, chair of Technology and Mechanical Engineering, Lewis Institute, and Professor John E. Sweet, of Vanderbilt University.

Judges, observing: M. M. Kirkman, second vice-president of the Northwestern Railroad; Paul Morton, vice-president of the Santa Fe Railroad; Arthur J. Eddy, president of the Chicago Automobile Club; F. S. Fish, South Bend, Ind.

Judges of Racing: Charles T. Yerkes, Arthur Catton, C. K. G. Billings, Will J. Davis, and Brode B. Davis, all prominent Chicagoans.

Starter, Richard J. Dwyer.
Clerk of the course, Hugh Keough.
Handicapper, Alderman Frank T. Fowler.
Supervisor of entries, L. M. Houseman.
Weigher-in, C. G. Graves.
Purser, Charles J. Gray.

Among those exhibiting at the exhibition were the following:

Chicago Motor Vehicle Co.
Triumph Motor Vehicle Co.
Crowdus Automobile Co.
Gormully & Jeffrey branch of the American Bicycle Co.
Hewitt-Lindstrom Motor Co.
Canda Bros. Auto Quadricycle Co.
Woods Motor Vehicle Co.
Waverley branch of the American Bicycle Co.
C. C. Hill Automobile Co.
Locomobile Co. of America.
De Dion-Bouton Motorette Co.
Riker Motor Vehicle Co
Winton Motor Carriage Co.
E. R. Thomas Motor Co.
Hub Motor Co.
World's Dispensary Automobile Co.
Eastman Automobile Co.
Olds Motor Works.
McMullen Power Co.
Friedman Automobile Co.
Kokomo Rubber Co.
Helios-Upton Co.
St. Louis Motor Carriage Co.
Giddings & Stevens Motor Vehicle Co
United States Ball-Bearing Co.
Consolidated Rubber Tire Wheel Co.
Buffalo Gasolene Motor Co.
Mobile Co. of America.
New York & Ohio Co.
The Motor Age.

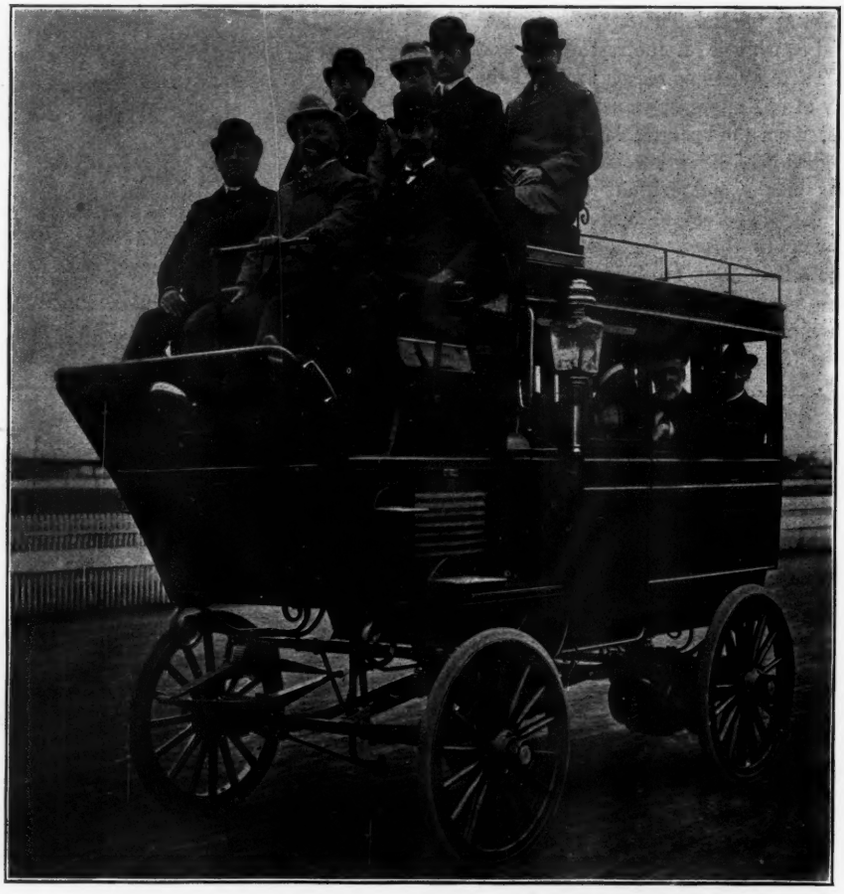


FIG. 3.—THE HEWITT-LINDSTROM ELECTRIC OMNIBUS THAT WON A GOLD MEDAL AT THE CHICAGO EXHIBITION.

Exhibition Notes.

The Locomobile Company, of New York, exhibited several steam carriages.

Mr. C. E. Woods, late of the Woods Motor Vehicle Company, was a prominent figure at the exposition.

Mr. J. H. Dennison looked after the interests of the Eddy Electric Manufacturing Company, of Windsor, Ct.

The United States Ball-Bearing Company had its Chicago representative, Mr. K. F. Peterson, looking after its interests. It exhibited specimens of anti-friction bearings.

Haynes & Apperson's gasoline machine was seen at the show, although it arrived later than the others. Their factory is located at Kokomo, Ind.

The Helios-Upton Company, of Chicago, Philadelphia and Peabody, Mass., showed a full line of batteries, the exhibit being in charge of Mr. Wm. Hood.

Strong & Rogers, of Cleveland, Ohio, showed a very handsome stanhope, it being a prominent feature of the exposition. The vehicle was in charge of Mr. Rogers.

The representative of the Automobile Patent Exploitation Company, of New

York, Mr. W. H. Edmunson, acted as secretary to Mr. F. R. Fish, chairman of judges on technical tests.

The Wagner Electric Manufacturing Company, of St. Louis, Mo., had one of its charging outfits in practical operation. Mr. Geo. B. Foster, Chicago manager, looked after the company's interests at the exposition.

Walker and J. H. McDuffee, of the company, among others, were present.

The auto-sparker, made by the Moltsinger Device Manufacturing Company, of Pendleton, Ind., was shown. It is a small electric generator and is operated by the flywheel of the engine to which it is attached.

The Olds Motor Works, of Detroit, Numerous trips were made in it with interested visitors. The exhibit was in charge of Manager Olds.

The De Dion Motorette Company, of Brooklyn, N. Y., had three motorettes in operation. These vehicles were on the track a great deal of the time and attracted considerable attention. The company was represented by Messrs. C. G.

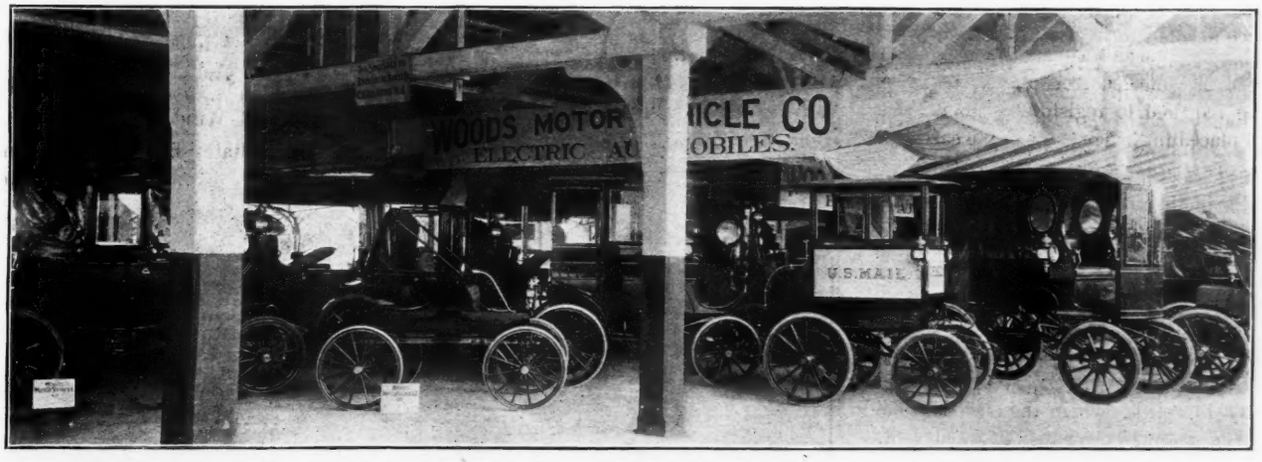


FIG. 4.—EXHIBIT OF THE WOODS MOTOR VEHICLE COMPANY AT THE CHICAGO EXHIBITION.

FIG. 5.—EXHIBIT OF THE HEWITT-LINDSTROM MOTOR COMPANY AT THE CHICAGO EXHIBITION.

The Mobile Company of America, whose factory is located at Tarrytown-on-the-Hudson, N. Y., exhibited several types of steam vehicles. Messrs. J. Randolph Wridgeway and G. S. Gelston. One of the carriages, a motorette, came over the roads from Albany, N. Y., to Toledo, Ohio, making 1,600 miles in three weeks,

Mich., exhibited a very handsome electric stanhope, which is illustrated elsewhere in this issue. It was beautifully finished and came in for a large share of praise.

averaging 80 miles a day. The De Dion motors, up to date, captured three first prizes and one second.

The American Bicycle Company, of New York city, exhibited, in the large space devoted to it, the productions of its several factories. Among them were several carriages from the Waverly Works, at Indianapolis, the Gormully & Jeffery stanhope, with motors attached to the forward axles; the Cleveland motor tricycles and the Trimoto automobile from the Crescent Sales Department, Chicago. The display was very attractively arranged.

The Ohio Automobile Company, of Warren, Ohio, showed types of its new nine horse-power "Packard" gasoline automobile. Mr. Packard, of this company, is well known in the electrical field as the manufacturer of Packard lamps and transformers. The machine has been developed regardless of cost, the company having in mind perfect service upon ordinary American roads. The company claims that all the details of this machine are entirely new and has profited by knowledge acquired of the most modern European methods of manufacture.

The Woods Motor Vehicle Company, of Chicago, has the largest exhibit at the exposition. It consisted of all the types of electric vehicles manufactured by this company including broughams, stanhopes, runabouts, brakes, road wagons, delivery wagons, hansoms and coupes. Nearly 30 vehicles were exhibited and a competent corps of gentlemen from the Woods company's offices were on hand to pilot interested visitors through the exhibit and explain the operation of the various types. A number of vehicles were placed at the disposal of those attending the exposition.

The Winton Motor Carriage Company, whose factory and general offices are located in Cleveland, Ohio, was well represented at the exposition. It showed various types of gasoline vehicles of very elegant design. The company claims for them strength, durability, speed and beauty. Mr. A. T. Winton was on the track a great deal in his record-breaking auto and carried off the honors in several races. The racing machines were closely inspected and considerable talk was heard of Mr. Winton's challenge to Mr. W. K. Vanderbilt, who, it is understood, has agreed to race Mr. Winton in Chicago.

The General Electric Company's exhibit, in charge of Mr. Geo. J. Cadwell, showed the Lemp steering check. This device is designed for use on any sort of vehicle for relieving the operator of any strain and retaining the steering wheels in the direction in which he sets them, regardless of obstacles which may be met with. The operator has absolute control of his machine and his vehicle is not affected by rough roads or railroad crossings or any other obstacles which would cause his machine to veer out of its course with any of the ordinary steering mechanism.

Mr. Clinton E. Woods, the designer and inventor of the Woods motor vehicles, and, until lately, general manager of the Woods Motor Vehicle Company, of Chicago, stated at the exhibition that he has now completed designs in which the mechanical and electrical features of electromobiles are simplified to such an extent that a radical departure from present methods may be made. It is claimed for the new design that the vehicle will have no gearing, the power being applied directly to the wheels, and that all of the control mechanism, including brakes and steering gear, is pneumatic and air-cushioned. It is expected that these new designs will very shortly be placed upon the market.

The Chicago Motor Vehicle Company had on exhibition in a large space gasoline breaks, several types of delivery wagons with interchangeable gears, etc. This company caters mainly to the commercial line and claims its vehicles are built with all the essential features of a commercial automobile, consisting of close control economy and practicability. The performance on Thursday of Mr. Worth, an operator connected with this company, in demonstrating the complete control over the machine by running over a box 12 inches high, cracking the shell of an egg

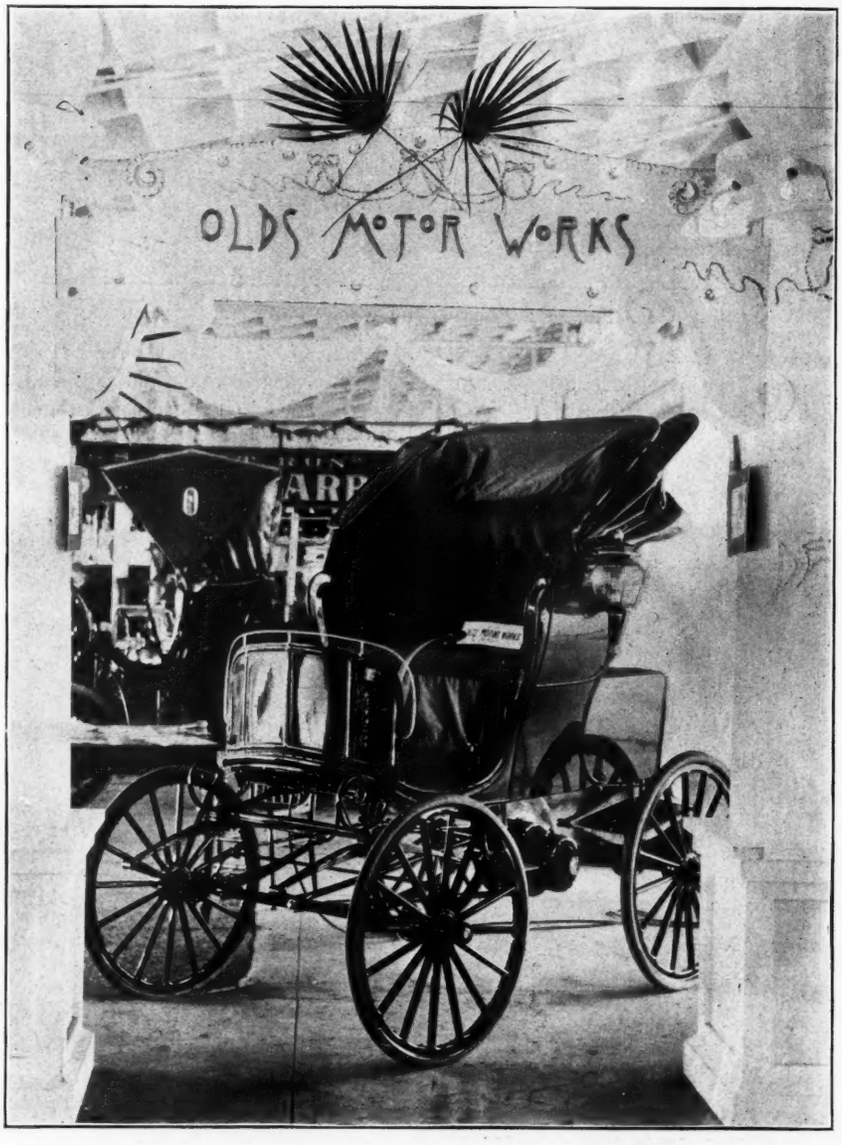


FIG. 6.—VEHICLE EXHIBITED BY THE OLDS MOTOR WORKS AT THE CHICAGO EXHIBITION.

and balancing the wagon on a huge see-saw, called forth deserved praise. The new factory of the Chicago Motor Vehicle Company, at Harvey, Ill., is rapidly being completed and will be in shape to turn out vehicles in large numbers. It will be equipped with first-class machinery.

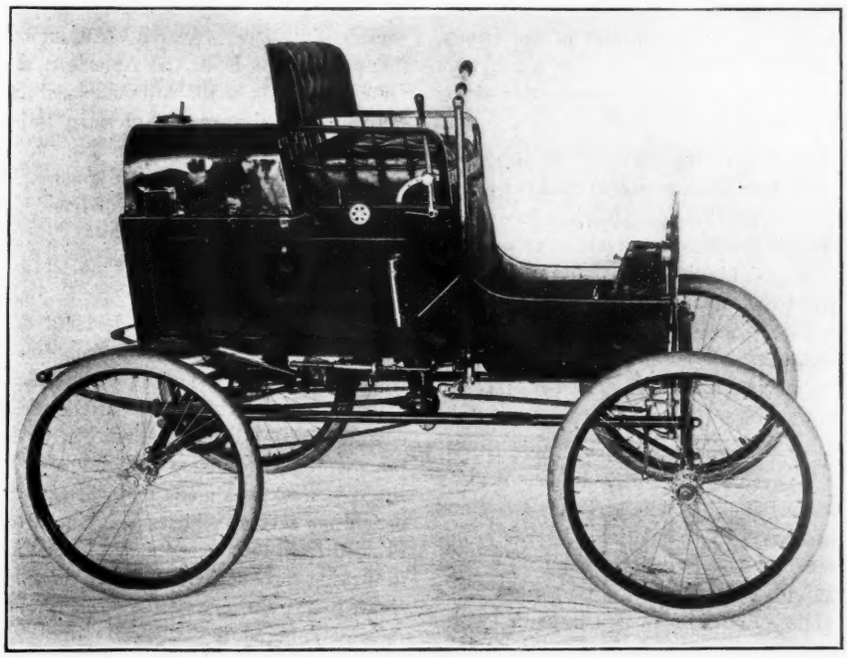


FIG. 7.—THE STEAM AUTOMOBILE WHICH MADE A MILE IN 1:06 AT THE CHICAGO RACE MEET.

One of the neatest little devices shown at the exhibition is an instrument known as the auto-sparker. It consists of a small shunt-wound dynamo, arranged to be driven by friction from the flywheel of a stationary engine and also for use on automobiles. It was shown at the exhibition in connection with the St. Louis Motor Carriage Company's vehicles, being used upon them to explode the charge of gasoline vapor and air in the explosion motors. Mr. French, the president of the St. Louis Motor Carriage Company, made the trip overland from St. Louis to Chicago, a distance of 450 miles, in one of his carriages and states that he had no batteries on board at any time during the whole trip. This ingenious machine, which seems to afford a practical solution for many of the difficulties encountered with batteries and spark coils, is manufactured by the Motsinger Device Manufacturing Company, Pendleton, Ind.

The Hewitt-Lindstrom Motor Company, Chicago, had a large exhibit located near the gate of the exposition, which attracted much attention from visiting automobolists. It was presided over by Chas. A. Lindstrom, secretary and electrical engineer of the company, assisted by Messrs. Conrad, Randolph, Rich, O'Connell and Vance. The large omnibus made by this company was closely inspected and was the vehicle which won the gold medal for seating the greatest number of passengers. The company also showed types of delivery wagons, stanhopes, electric brakes and a runabout. The latter machine, although not built for racing, carried off a gold medal as first prize, making a mile in 2 minutes and 34 seconds, against strong wind and heavy track. The company also received a gold medal for having the greatest number of practical designs in the parade, and a gold medal for the greatest number of vehicles in the parade, making four medals in all. A charging outfit, furnished by the Milwaukee Electric Company, of Milwaukee, Wis., was located in their booth. Mr. John B. Conrad, of this company, is the inventor of the batteries used in all the Hewitt-Lindstrom vehicles.

FIG. 8.—EXHIBIT OF THE AMERICAN BICYCLE COMPANY AT THE CHICAGO EXHIBITION.

Automobiles

There are over 700 members of the Automobile Club of Great Britain and Ireland.

There are now 13 regularly incorporated automobile clubs in the United States.

The Automobile Club of Great Britain will hold an automobile exposition at the Agricultural Hall, London, May 4 to 11, 1901.

A New Jersey court has decided that a steam automobile is not a nuisance on a public highway even if it causes horses to run away.

The School of Engineering of Columbia University, New York city, has a new course of study dealing with the construction of automobiles, self-propelling road engines and railway cars.

Mr. E. E. Schwarzkopf has tendered his resignation as editor of the *Automobile Magazine* to the receiver of the United States Industrial Publishing Company, publishers of the magazine.

The new Union of German Automobilists is said to have at the present time over 2,000 members. It is expected that at an early date a large number of German automobile clubs will also join.

The Greater Interstate Fair is in progress at Trenton, N. J., during this week, as already announced in the ELECTRICAL REVIEW. One of the features of the fair will be automobile races and an exhibit of many types of self-propelled vehicles.

A new apartment house in course of erection at West End avenue and Seventy-ninth street, New York city, will have attached to it an automobile stable for housing the automobiles of tenants. Facilities for charging electromobiles are provided on the first floor and the second floor is intended for living apartments for the automobile attendants.

Last Saturday night the steam automobile of Mr. Whitney Lyon caught fire while the owner was replenishing the tank with gasoline and blazed away in such fashion as to require the calling out of the fire department of Larchmont, N. Y., where the accident occurred. The machine was badly damaged and Mr. Lyon was somewhat burned while pushing the blazing vehicle out of the barn in which it caught fire.

In the first day's programme of the Interstate Fair, lately held at Trenton, N. J., automobile races appeared as a feature on the programme. There was a large crowd present and no less than five races and one exhibition run against time for automobiles were scheduled. There were no electric racing vehicles in the events. Mr. S. T. Davis, Jr., of New York, with a steam racing wagon, was the star of the occasion.

Mr. Albert Bostwick, of Mamaroneck, N. Y., who is a prominent member of the Automobile Club of America, has issued a public invitation to train horses owned in his neighborhood so that they will no longer be afraid of automobiles. Mr. Bostwick urges that where horses are frightened by automobiles, the fault is generally with the driver, who is engrossed in watching the machine as it goes by and thus neglects the reins.

A party of four persons abandoned a two-seated automobile at Tenth street and Broadway, New York city, early one morning last week. The police took charge of it and got an operator of a public automobile to run it to the police station. The next day the owner of the vehicle called for it and said the persons who had borrowed it told him the battery had given out and that they left in on the street confident that it would be properly taken care of by the police.

A gasoline automobile was overhauled and arrested by bicycle policeman John Fogarty, on the evening of September 24, while running along Fifth avenue near One Hundred and Fourth street, in New York city. The arrest was made because the machine was going too fast and it caused the bicycle policeman a good deal of trouble to catch it. The riders deposited cash bail at the police station but did not appear when their case was called the next morning.

At the Automobile Show, to be held in the Grand Central Palace, Forty-third street and Lexington avenue, November 14 to 24, 1900, the exhibits of accessory lines and parts will be placed on the main floor. Mr. Marcus Nathan, the manager of the show, states that a large amount of space has already been sold to vehicle makers. He regards the educational feature of the Automobile Show as highly important, and states that it is now certain that the exhibits will be complete, comprehensive, and of a character to command attention.

The Stearns Automobile Company has recently been organized for the manufacture of motor vehicles of the hydro-carbon type. Its capital stock is $1,000,000. E. C. Stearns, of Syracuse, N. Y., formerly connected with the Stearns Bicycle Company, is president; W. W. Gibbs, of Philadelphia, formerly connected with the Electric Storage Battery Company, is vice-president. The Stearns Automobile Company succeeds to the American and Canadian rights of the patents owned and controlled by the Anglo-American Rapid Vehicle Company. It has leased and is now operating the plant, in Syracuse, N. Y., formerly occupied by the Barnes Cycle Company.

After the automobile races at Guttenberg, last week, both Messrs. A. C. Bostwick and D. Wolfe Bishop declared that they would not contest any more on a track because of the risk; nevertheless, both are entered at the races at the forthcoming Greater Interstate Fair, at Trenton, N. J. The danger of high speeds on the race track was made plain at Guttenberg when several vehicles weighing a ton skidded from four to seven feet to the side in turning corners. The marks on the track showed this, and one of the French automobiles suffered a badly cut tire. Mr. Bostwick is credited with saying that in his opinion he undoubtedly traveled faster than a mile a minute on the straight sides of the track during the mile that he made in 1.27 4-5, because he had slackened speed so much when he made the turns.

The recent experiment conducted at Hartford, Ct., with automobiles for the collection of mail, carried on by the Electric Vehicle Company for the purpose of ascertaining what the requirements of the mail service are, and therefore enabling them to produce a machine especially adapted to that purpose, has proven of considerable value to the post office officials and the company. Although it was not expected that the vehicles used in the experiment would be adopted by the Government, they, nevertheless, served admirably and accomplished the purpose of the company, and have given very little trouble under the present system of operating. It is anticipated that it may be only a short time before automobiles will be regularly used for the collection of mails, as well as for many other similar purposes.

United States Consul Geary writes from Malaga, Spain, as follows: "I give herewith a resume of the new order relative to the local tax on automobiles, as follows: The better class of private automobiles will pay, in cities having a population of 100,000 or more, a tax of 80 pesetas, or about $11.58, for each vehicle, and for each seat, including that of the

conductor, 9.40 pesetas ($1.36). In cities having from 20,001 to 99,999 inhabitants, a tax of 40 pesetas ($5.79) for each vehicle will be charged, and for each seat of the same 4.76 pesetas (69 cents). In other places of less than 20,000 people, the taxes are 20 pesetas ($2.89) for each vehicle and 2.35 pesetas (34 cents) for each seat. Automobiles for traveling along the public roads will pay for each kilometre (0.62 mile), 4 pesetas (58 cents), and for each seat and kilometre of travel, 0.25 pesetas (3.5 cents)."

The New York Motor Vehicle Company has just finished its model public passenger omnibus, and will have it on exhibition at the Automobile Show, in the restaurant section of Madison Square Garden, November 3 to 10. This company has an order for a large number of omnibuses, and the present model is the outcome of a considerable amount of study and investigation. The company sent its engineers to Europe to carefully look into the merits of the different motors at all of the great manufacturing centres with the result that it has adopted steam as its motive power, and, with this decided, it has sought and secured what it thinks is a combination of the best parts, and which, altogether, form the best steam motor at present in the market. The company's model omnibus is made to seat 20 passengers, and differs in style and size from anything made so far in this country.

At the Tri-State Fair, recently held at Guttenberg, N. J., one of the principal features of interest was automobile races. The races took place on a dirt track in the presence of several thousand people, and several high-speed records were made. Mr. A. C. Bostwick made a record of one mile in one minute and twenty-seven and four-fifths seconds, and five miles in seven minutes and forty-three and one-fifth seconds. The next best record for the five-mile race was that made by Mr. W. K. Vanderbilt, Jr., on the half-mile track at Newport, R. I. In the contest between the French racing machines of Mr. Bostwick, Mr. D. Wolfe Bishop and Mr. A. L. Riker, the latter having an American-built electromobile, which won the 50-mile road race on Long Island last Spring, Mr. Riker had the misfortune to suffer a short circuit of his batteries at the end of the first mile when he was about 50 yards in the lead. Mr. Bostwick won the race, which was for 10 miles. A number of other races were at five miles each and were mostly between gasoline vehicles. The results are given in full below:

Gasoline Vehicles, four wheels, of less than 1,000 pounds, any make; five miles—Won by C. J. Field, New York; F. T. Craven, New York, second; J. Lauveguez, New York, third; C. S. Henshaw, Brooklyn, fourth. Time, 2:35, 4:46, 7:00 3-5, 9:19 4-5, 11:43 3-5.

Gasoline Vehicles of more than 1,000 pounds, any make; five miles—Won by A. C. Bostwick, New York; D. Wolfe Bishop, Newport, second. Time, 1:43 4-5, 3:12 4-5, 4:43 2-5, 6:13 2-5, 7:43 1-5.

Tricycles, any kind; five miles—Won by C. S. Henshaw, Brooklyn; J. Lauveguez, New York, second; Stanley R. Atkinson, New York, third. Time, 1:54, 3:34 2-5, 5:18 4-5, 6:51 3-5, 8:24 3-5.

Electric Vehicles, any kind; five miles—Walkover for A. L. Riker. Time not taken. Steam Vehicles, four wheels; five miles—Won by W. J. Stewart, Newark; W. L. Hibbard, Bridgeport, second; S. T. Davis, New York, third; S. Huston, Newark, fourth. Time, 2:02, 4:16 3-5, 6:46, 9:15 1-5, 11:48.

"Championship," open to first and second prize winners in the preceding events, except the first and that for tricycles; ten miles—Won by A. C. Bostwick, New York; D. Wolfe Bishop, Newport, second. Time, 1:46, 3:20 4-5, 4:49, 6:18, 7:47, 9:15 4-5, 10:44 3-5, 12:12 3-5, 13:41 2-5, 15:09 1-5.

Brake manipulation test, to stop in shortest space after a given signal—Won by C. R. Stockbridge, Newark; C. S. Henshaw, Brooklyn, second; D. Wolfe Bishop, Newport, third.

Obstacle race, open to all except bicycles and tandems, and no pedal assistance to be given, test being to pass in shortest time between placed objects without disturbing them—Won by D Wolfe Bishop, Newport.

International Association of Municipal Electricians.

The fifth annual meeting of the International Association of Municipal Electricians opened in Pittsburgh, on September 25, and will continue until September 27. The officers of the association are as follows: President, Capt. William Brophy, chief electrician of the Wire Department of Boston, Mass.; vice-president, G. F. MacDonald, superintendent of fire telegraphs, of Ottawa, Can.; treasurer, Adam Bosch, superintendent of fire telegraphs, Newark, N. J.; secretary, Geo. H. F. Cottell, city electrician, Boston, Mass.; financial secretary, Burt C. McAllister, chief engineer and superintendent of the fire telegraph, of Bradford, Pa.

The programme will include papers on a large number of subjects of interest to municipal electricians and others connected with the executive and operating departments of city fire alarm and police telegraphs. The headquarters of the association are at the Monongahela House, where the sessions of the association are being held in the banquet hall. A number of interesting excursions and other entertainments have been arranged for the benefit of the delegates, among them being a long ride down the Ohio River and back up the Monongahela River, on a steamboat, which will take place Thursday afternoon. The convention was opened with an excellent attendance and everything promises an interesting and valuable session.

American Street Railway Association.

Secretary T. C. Penington, of the American Street Railway Association, informs the ELECTRICAL REVIEW that matters are progressing as rapidly as possible in regard to the forthcoming convention at Kansas City, Mo., which meets on October 16, 17, 18 and 19. The space in the exhibition hall is nearly all engaged and Mr. Penington expects that the meeting will be a very successful one.

Arrangements for the special train to leave New York, Sunday morning, October 14, have about been completed, and it now seems assured that there will be a sufficient number going from this point to secure a through run that will land the special in Kansas City, Monday evening, October 15. If this is done the train will leave Sunday morning about 10 o'clock, over the New York Central, going *via* the Lake Shore and Big Four to St. Louis, and over the Wabash Railroad from St. Louis to Kansas City. The representatives of these roads and of the Pullman Company assure the committee that everything will be done to make the train an especially attractive one, and the trip agreeable throughout. The committee having the matter in charge announce that a rate of one and one-third for the round trip has been secured and all passengers should purchase tickets on the certificate plan.

It is hoped that enough passengers will have been heard from by the first of next week to announce definitely the exact itinerary of the special train. Members of the committee should be communicated with at the following addresses: H. H. Vreeland, 621 Broadway; J. H. McGraw, 120 Liberty street; Charles W. Price, 13 Park row, and T. C. Martin, 120 Liberty street. Mr. Charles S. Clark, 8 Oliver street, Boston, has charge of the arrangements in that city.

Annual Report of the Boston Wire Department.

The sixth annual report of the Wire Department of Boston, Mass., covering the period from February 1, 1899, to February 1, 1900, has just been issued by the Hon. Thomas W. Flood, commissioner of wires. This volume lives up to the reputation of its predecessors as a careful compilation of the work of a city department; and as an interesting showing of the evil effects of careless work in electrical construction. It contains a number of handsome plates and a handsomely engraved map, on a large scale, of the lower section of Boston, showing the underground electrical construction in the city.

ELECTRICAL INTERESTS DESTROYED BY THE GALVESTON FLOOD.

BY FRANK B. KNIGHT.

The awful catastrophe which has overwhelmed the beautiful and prosperous city of Galveston is without a parallel, in many of its features, in the history of this country, at least. The Galveston *News* of Saturday morning, September 8, says: "At midnight the moon was shining brightly and the sky was not as threatening as earlier in the night. The weather bureau has no late advices as to the storm (in the South Atlantic) and it may be that the tropical disturbance has changed its course or spent its force before reaching Texas." And yet it can not be said that warnings of the approach of an unusually terrific storm had not been sent out by the weather bureau. It was thought, however, that the storm might come up the Atlantic coast instead of being deflected across the gulf. Hurricane warnings were sent to points on the Texas coast on the evening of the seventh. The last telegraphic reports to the bureau from Galveston were sent at 3.40 o'clock on the evening of Saturday and showed the barometric pressure of 29 inches, with northeastern wind blowing 42 miles an hour. At the time this report was sent a heavy sea had, for some time, been rolling in from the southeast, which had submerged nearly half the city.

FIG. 1.—TREMONT STREET, GALVESTON, BEFORE THE STORM, LOOKING TOWARDS THE GULF, AND SHOWING OVERHEAD TELEPHONE LINES.

To understand the situation thoroughly it should be remembered that the city of Galveston is built upon an island of sand, distant from the mainland about three and one-half miles, from which the island is separated by an arm of the gulf called Galveston Bay. This is on the west, while on the east and south is the Gulf of Mexico proper. The highest point on the island is only about 25 feet

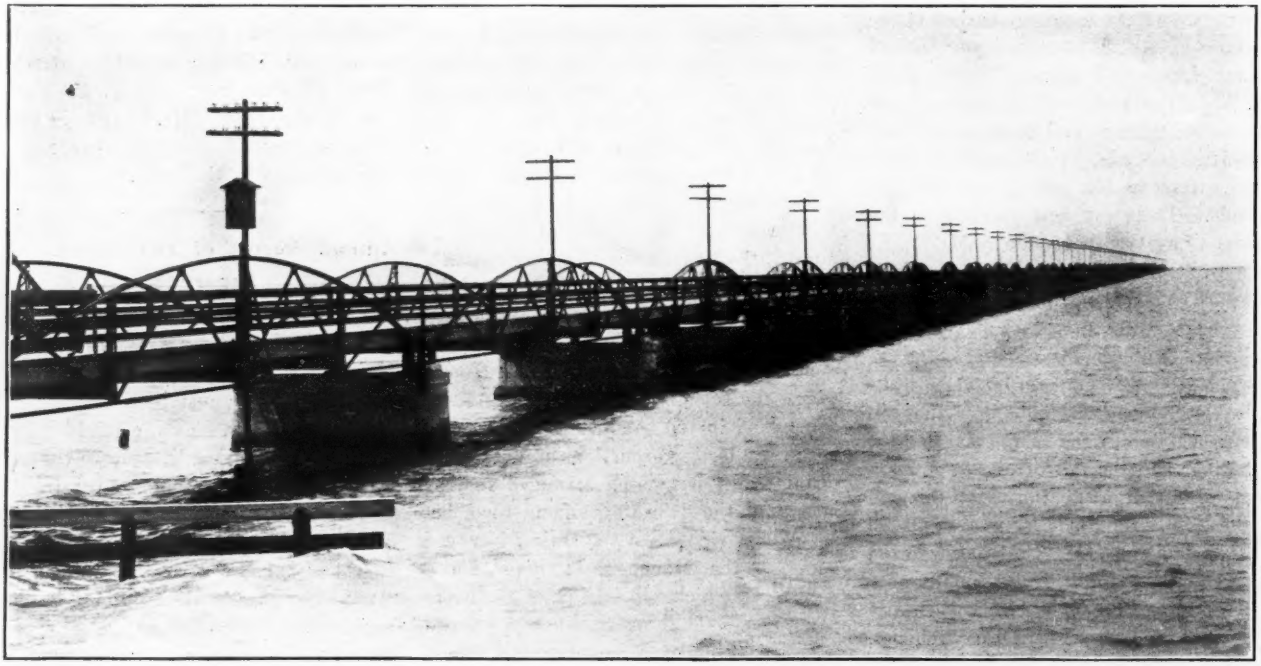
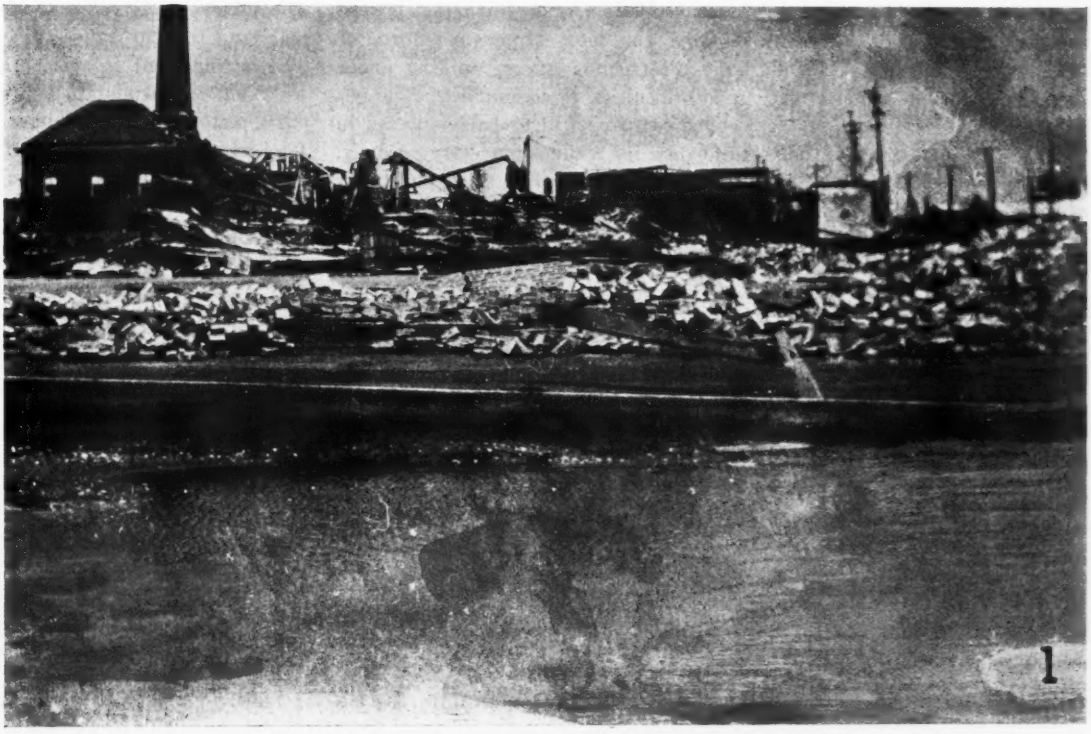


FIG. 2.—THE GALVESTON BAY BRIDGE BEFORE THE STORM, LOOKING WEST FROM THE DRAW TOWARD THE ISLAND—THIS BRIDGE WAS TWO MILES LONG, AND THE LONGEST OF ITS KIND IN THE WORLD.—THE POLE LINE SHOWN CARRIED TELEPHONE WIRES.

above sea level, and the mean average elevation is, I believe, only about six feet.

The wires of the Postal Telegraph Company entered Galveston through a submarine cable by the way of Bolivar Point, and this was swept away by the tempest at about the same time other communication was severed. The railroads carried their wires and those of the Western Union Telegraph Company on the bridges, while the long-distance lines of the Southwestern Telegraph and Telephone Company



Published by courtesy of *Leslie's Weekly.*

FIG. 3.—WRECK OF THE POWER HOUSE OF THE GALVESTON CITY RAILROAD COMPANY.—FORTY PEOPLE WERE KILLED IN THIS BUILDING.

Published by courtesy of *Leslie's Weekly.*

FIG. 4.—GENERAL VIEW OF THE DESTROYED RESIDENCE SECTION OF GALVESTON, SHOWING DESTRUCTION OF ELECTRIC LIGHT AND STREET RAILWAY WIRES.

The bay was crossed by three railroad bridges, besides a county wagon bridge, said to have been the longest in the world.

were strung upon the county bridge, as the illustration well shows. These bridges were all destroyed during the afternoon of Saturday, thus cutting off Galveston entirely from communication of any sort with the outside world, except that furnished through the submarine cable across the gulf to Tampico and Vera Cruz, Mexico, which also lasted but a brief time longer, and then became silent. Here was a city of between 50,000 and 60,000 people undergoing all the horrors of a frightful calamity, its people caught like rats in a trap, with no means of making known their awful plight, no way of escape, no hope of succor. The daily papers have been filled with the details of death and destruction, so it will not profit to repeat them. Suffice to say that from 4,000 to 9,000 lives have been lost, 4,000 houses and public buildings have been destroyed; street car, electric light, telephone, telegraph and water works plants have been partially or wholly wrecked, and of the buildings left standing probably none have escaped some sort of injury.

But to those of us here who are familiar with Galveston, and who have sustained intimate relations with its people, the frightfully large death list and the record of wreck and desolation appeals in a peculiarly sad way. From what can be learned, the destruction of property of the electric companies has been pretty complete, but details are, as yet, difficult to obtain. There was no underground construction in Galveston, and a gale, blowing at the rate of from 85 to 100 miles an hour, would hardly prove much of a respecter of aerial fixtures and wires. I learn that the plant of the Southwestern Telegraph and Telephone Company, outside of its fine building, was completely destroyed, and as the plant of this company was practically new and of the most substantial character, it is not hard to believe that other like properties are in no better plight. Of course, the electric light and street car companies suffered, and the city has been in darkness except for the feeble illumination afforded by a scant supply of candles.

The wrecked power house, which is shown in Fig. 3, belonged to the Galveston City Railroad Company. This company operated 36 miles of electric track and its power house contained 870 kilowatts of generators operated by 825 horse-power in engines and boilers. This equipment, as the illustration well shows, is practically a total wreck. There were 64 motor cars in operation and 12 tow cars at the time of the storm. No less than 40 persons were killed in this power house when it collapsed.

Telegraphic communication has already been established between the mainland and the island through constructions which, while temporary in character, have required the most strenuous efforts of large construction gangs, working under great difficulties, to accomplish. The telephone company will probably succeed in restoring its connection very shortly.

With the construction of a temporary structure over which trains can be sent into the city, conditions in Galveston will soon assume a more cheerful aspect, and with improved facilities thus afforded for moving material, the work of restoring the properties of the electric companies, as well as that of the city in general, will, in all likelihood, progress rapidly. As to the future of Galveston, a most hopeful spirit is beginning to manifest itself, notwithstanding the astoundingly discouraging conditions with which its people are confronted, and a bigger and a more substantial Galveston is being confidently talked of.

Austin, Tex., September 16.

The Majert Accumulator.

A new type of accumulator, designed by Dr. Majert, of Berlin, is coming into use in France, and is now being made by a firm near Paris. In this battery, the negative plates are of the Faure type with lead grid upon which the oxide is pasted; a second form has a grid formed with horizontal projections, which are bent up after the active matter is applied, thus holding it in place. The construction of the positive plate is the main characteristic of the system; it is of the Planté type, being of solid lead upon which a layer of peroxide of lead has been formed; this form is considered as more solid and will permit of discharging at a greater rate, while at the same time a great capacity is obtained; however, to realize these advantages, a great surface must be obtained within small dimensions. The usual method of doing this is to make a plate with a great number of grooves, but this is somewhat difficult in practice. With the plate made by the Majert process, for a battery of one to three hours' discharge, the grooves are about two-fifths inch deep and one-fiftieth inch wide, separated by one fiftieth inch. A plate of this kind can not be obtained by moulding, and the method of forcing it through a die by hydraulic pressure involves too great an outlay for dies and power. In the Majert process, a traveling cutter is used, of special form, which cuts the required groove in the plate; an arrangement is used to take out the shaving perpendicularly at each cut. The plate is placed on a perfectly plane table, and to keep the lead flat a roller passes over it in advance of the cutter. The plate is thus cut on both sides; the tool can make 90 courses in one minute. The arrangement is automatic, and one workman can attend to two plates. To cut a plate having 100 square inches surface requires about 10 minutes, making 50 to 60 plates per day.—*Scientific American.*

A New Gutta-Percha.

The English acting-consul for Zanzibar reports the discovery of a new gutta-percha. This substance is derived from a tree which grows principally at Dunga. When tapped with a knife, a white fluid emanates, which, when placed in boiling water, coagulates into a substance which, in character, bears a very striking resemblance to gutta-percha, says the *Scientific American.* As the material cools it becomes exceedingly hard, but while soft it can be moulded into any required shape. The fruit of the tree resembles a peach in shape, but grows to the size of a small melon. Experts have experimented with this new product to see if it in any way possesses the qualities of gutta-percha, and although it is not expected to prove equal to the genuine article, it is considered that it will be quite suitable for some purposes for which gutta-percha is at present utilized, and will thus become a marketable article. It is said to abound in Zanzibar, and will be a very cheap product.

A New Electrolytic Process.

Herr Hans A. Trash has recently patented a process for the extraction of nickel, copper and other metals from their ores, which the *Engineering and Mining Journal,* after a careful examination, believes will revolutionize the present methods of extracting, not only copper and nickel from their ores, but appears adaptable as well to the mining of silver, mercury and other metals, that have hitherto offered almost insurmountable difficulties to their economical extraction in the wet way. "The process consists of the electrolysis of a brine solution in such a manner that while the sodium ions are set free at the cathodes with the immediate formation of caustic soda, the chlorine ions are liberated in the anode section containing the matte, and immediately form a chloride solution of the metals present. These chlorides can be directly treated for the contained metals by electrolysis or chemical methods. It is claimed that the entire cost of the process will be fully met by the value of the caustic soda and other by-products."

Science Brevities

Electrostatic Lines of Force—In designing an instrument for plotting electric lines of force, analogous to the magnetic needle, the difficulties are encountered that the forces are small and the charge is not permanent. Mr. F. J. Rogers has, however, designed two kinds of "electrostatic needles" which answer very well, says one of Mr. Fournier d'Albe's abstracts. The first consists of an aluminum needle bearing at its ends two gilt pithballs. The needle is perforated in the centre and mounted on a horizontal pin stuck into an ebonite rod. With this simple contrivance it can be shown to the student that the lines of force are normal to the surface of a charged conductor, and not normal to the surface of an ebonite rod, and that in the case of two oppositely charged conductors placed near each other the lines of force issue from one conductor, curve over, and end on the other. The second form of needle is even more useful. It consists of a little ebonite rod in place of an aluminum needle, and the pithballs are charged positively and negatively, respectively. Thus we have a complete analogue of the magnetic needle. If the neutralizing rod of a Voss machine is removed while the machine is running, the inductors change the sign of their charge every few seconds. This change of sign is promptly indicated by the electrostatic needle described.

Electrification of Ice—In the course of some experiments on liquid air, Herren H. Ebert and B. A. Hoffmann noticed that a body suspended above the surface of the liquid acquired a strong negative charge. The following description of their experimental work is abstracted by the *Electrician* from the *Annalen der Physik*. A series of test experiments revealed the fact that this charge is not due to the liquid air itself, but to the friction of minute particles of very cold ice suspended in it. The authors even succeeded in constructing a kind of electrifying machine by means of a tube containing a piece of wire gauze through which the vapor of liquid air was driven. This phenomenon of electrification should be allowed for in all experiments with liquid air, as it may account for many errors and anomalies. Ice acquires a positive charge by friction with any metal, and imparts to the metal, and other bodies also, a negative charge. It appears to be the more active in this respect, the colder and the drier it is. This may account for the strong electric effects of polar snowstorms. Even in our latitudes, ascending currents of air soon reach elevations at which all their water freezes, and the friction of the ice crystals against suspended dust particles would account for part of the atmospheric electrification. In the highest regions, a friction between atmospheric ice and cosmic dust, together with solar ionization and the consequent conductivity of the atmosphere, might account for the luminescence often observed, and even for the aurora.

Continuous Discharges in Air—When a battery of cells is used as a source of electric energy, the constant element in the circuit is the electro-motive force, while the current depends upon a variety of external conditions. The case is reversed on using an influence machine driven at a constant speed, for then the mean current is the constant element, while the electromotive force is a dependent variable. This fact has been utilized by Herr M. Toepler for investigating the continuous discharge in air at atmospheric pressure as dependent upon the current, the following abstract of his published results appearing in the *Electrician*. This continuous discharge may appear in four different forms; *viz.*, glow, brush, brush arc and flame arc. All of these may appear both at the positive and negative electrodes, but to simplify matters the author takes care nearly to suppress the effects at one electrode by covering it with a flat bad conductor such as slate. He is thus enabled to study the effects at the two electrodes independently. As a general rule, an increase in the current strength brings about a transition from the glow to the brush, and, finally, to the brush arc. But this transition is not continuous unless the capacity in the circuit is negligible. Otherwise the three continuous stages are separated by stages of discontinuous spark discharge, and as the capacity increases the discontinuous stages encroach until the brush arc is almost entirely eliminated. Finally, the author deals at length with two forms of natural continuous discharge; *viz.*, St. Elmo's fire and globular lightning.

Resistance of Thin Films—Mr. A. C. Longden, writing in the *Physical Review*, continues his notes on the "Electrical Resistance of Thin Films Deposited by Cathode Discharge." The instruments for measuring the resistance which were used in these experiments were exceptionally accurate, and had a wide range. Beyond this range the resistance was measured by the direct deflection method. In applying this method a new form of water battery was used, consisting of two copper plates, one of which was amalgamated with mercury containing a little zinc. This plate was equivalent to a zinc plate, but it did not dissolve in the cell or become brittle like zinc plate does. The resistance of this cell may be varied with its size, or by the introduction into the water of a very small quantity of sulphuric acid. The cell, if properly made and sealed, requires no attention for several months, and its electro-motive force is practically constant. It, however, polarizes very quickly, and is only of use on high-resistance circuits. In measuring the temperature coefficients of film resistances, it was soon noted that the very thin films had negative temperature coefficients, and all the thick ones had positive temperature coefficients, and that for a certain range of thickness the temperature coefficients were almost at zero. Density also probably helped to produce this zero result. The length and width of all films tested were uniform, being 5 centimetres by 15 millimetres. The author then describes the process of adjusting and standardizing the film resistances, the choice of a metal for the production of standard film resistances, etc. The metal he chooses for the standard is platinum. His conclusions, stated briefly, are as follows: The process of depositing metals by cathode discharge is probably simple distillation, in which the vaporization of the cathode is largely due to its electrification; the temperature coefficients of the very thin films are negative, and for films within a certain range of thickness the temperature coefficients are approximately zero; the necessity for artificial ageing is proportional to the magnitude of the temperature coefficient. He states that in general his method is capable of producing standard electrical resistances of a very high degree of precision, and of any desired value, from a few ohms up to several megohms; that these resistances may be made of pure metals, and that they are therefore free from the possibility of decomposition changes; that the metals may be those least likely to enter into chemical combination with other elements; and that, in addition to these qualities as pure metals, they possess the only desirable qualities of alloys—namely, high specific resistance and low temperature coefficients.

STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK.

REPORT OF THE EIGHTEENTH ANNUAL MEETING, HELD AT BUFFALO, N. Y.

The eighteenth annual meeting of the Street Railway Association of the State of New York was held at Buffalo, N. Y., on Tuesday and Wednesday, September 18 and 19. The convention was called to order at 10.50 on Tuesday morning, at the Hotel Iroquois, with President G. Tracy Rogers, of Binghamton, N. Y., in the chair. The president read his annual address, in the course of which he said:

During the past year we have enjoyed the fruits of the good times, and the close of the convention year finds us in a more prosperous and healthy condition. While there have been no startling developments, we have all advanced in the line of improvement in every direction, in construction, equipment, and I believe also in our relation to the municipalities and to our employees. The consolidation of the street railroads throughout our state is still the order of the day, and, in some instances, consolidation with other electrical interests has been effected.

Although there has been considerable extension of city roads into the country, as well as building of interurban lines in the past year, some who contemplate still further extensions are waiting a reduction in the price of steel and other materials, and the settlement of the political question which now confronts us before carrying out their plans.

Before the smaller cities and towns of our state can expect any radical improvements in their street railroad construction, or can render the service the public demands, the law requiring the street railroads to pay for pavements must be amended. Much has been said and written upon this subject, and I believe that the public is aware of the unfair and the unjust burden that is being placed on the small roads in these localities. It is the duty of the state of New York to rectify this serious error, which, in nearly every instance, means in the end a receiver, as has been illustrated throughout the state. The smaller cities try to impose the same burdens on street railroads as do the larger cities upon their roads. What might not be a heavy burden to the one means destruction to the other. The suggestion has been made that each municipal body granting a franchise should be authorized by the statute to make a special contract with the applying corporation for either the construction and maintenance of pavements in the whole or different sections of the locality. The lack of elasticity in the present statute militates strongly against the best requirements of small cities for the joint interests of the roads and the public.

The report of the executive committee dealt briefly with the affairs of the association, and particularly with reference to membership and legislation. The process of consolidation was responsible for some further withdrawals of expiring corporations, while on the other hand gains were perceptible from the non-member companies. The status of legislation during the past year was reported as satisfactory. The treasurer reported the total receipts for the year as $7,050.64, with expenditures of $4,948.15, leaving a balance on hand of $2,102.49.

A paper on "Railway Power Transmission" was read by Mr. A. H. Armstrong, General Electric Company, Schenectady, N. Y., in which it was shown that the electric railway field has become so broad and so complex in its engineering problems, that no one system of distribution is adapted for all classes of service. A small congested system demanded a 500-volt, direct-current system; larger systems presented the dividing line between the 500-volt, direct-current system and the alternating-current, sub-station system. Suburban roads, with considerable length of track, heavy cars and high speeds, usually found the alternating system cheaper both as to operation and first cost.

In reply to Mr. Harrison, Mr. Armstrong stated that for a given voltage on the alternating-current system the current an induction motor required was from 15 to 20 per cent larger, as an average, for railway work, than with the direct-current system. Stationary motors got along with an addition of from 12 to 14 per cent.

The next paper was entitled "Accidents on Street Railroads; Methods Employed in Handling Same and Preparation for Trial," read by Mr. D. W. Patterson, of the Metropolitan Street Railway, New York.

This paper elicited considerable interest and discussion. Mr. Patterson pointed out that the growth in number of claims had increased enormously in recent years, owing principally to the cupidity of lawyers. At present the Metropolitan Company has pending 1,900 claims, aggregating more than $16,000,000. Different methods of procedure were adopted in treating the various kinds of claims, some being settled at once, while others were allowed to age, and as a result of the latter process a great many claims were abandoned. In looking over the records the other day he had found that 6,000 cases which were started by lawyers and had got to the stage of serving complaint and answer had never been moved. That was an asset which they carried without much fear.

Mr. Vreeland, of the Metropolitan system, said that they had adopted the plan of investigating every single case of accident, no matter how slight, so that if claims resulted a record of the facts was available. They had also made "stop tests" under the auspices of the State Railroad Commissioners, which the speaker recommended as of great utility in counteracting the tendency to underestimate the time within which cars could be stopped in an emergency.

President Charles F. Schoepflin, of the Buffalo, Gardenville & Ebenezer Railroad, stated that he had secured the best results by dealing directly with claimants instead of through their attorneys; it would often cost more to prepare for trial, even if the defendant got a verdict, than it would have cost to settle the case in the start.

President Rogers, in reply to Mr. Boyle, stated that in the tests referred to by Mr. Vreeland the stops were made in from 42 to 50 feet, as he remembered it—the cars being run at the maximum speed they could attain.

W. W. Cole, of Elmira, said that in a number of cases recently he had noticed that nine out of ten went to the jury on the question of the speed at which cars were run, and to-day they ran their cars with speed indicators, in case of accidents, to determine the actual speed, and in two cases obtained a non-suit where the question was entirely one of speed.

Mr. Hasbrouck, of the Metropolitan Street Railway Company, said he had always found sympathy a very effective aid in reaching a satisfactory settlement.

Mr. Ira McCormack, of Cleveland, urged that companies notify one another of any individuals working fake schemes for claims, which practice was becoming so frequent of late years.

A paper entitled "How Can We Increase the Efficiency of Employees," was then read by Mr. E. G. Connette, vice-president and general manager, Syracuse Rapid Transit Company. Mr. Connette advised kind treatment, praise and encouragement, as well as reproof; the reward of merit, and that bulletins should set forth their contents concisely, simply, comprehensively and in doses that could be digested.

Mr. Godfrey Morgan, of the Gorge Railway asked whether any action had ever been taken by the committee appointed at a previous meeting to report on standardizing rules and regulations. The president reported that the matter had been dropped because of the objection on the part of the smaller companies to operating upon any plan deemed feasible by the larger concerns. Mr. Vreeland cited the success that had been attained in this direction upon the steam roads of the country.

Hon. W. Caryl Ely, president, International Traction Company, offered the following: Resolved, that the committee to which this subject was heretofore committed be and the same is hereby discharged and that the president is authorized to appoint a new committee of five, to consist of representatives from roads in large and small cities and suburban roads, to take this subject under consideration and report to the next convention.

The title of the next paper was "The Storage Battery; Its Use on Small Roads," by B. B. Nostrand, Jr., Peekskill Electric Light and Power Company. This is a road four and three-quarters miles in length, with grades throughout the greater part of the line varying from two to nine per cent, single track, with four turnouts.

The apparatus for operating the road consists of one 60-kilowatt Edison bipolar 575-volt, 888 R. P. M. generator, belted to a horizontal 13 by 12 Armington & Sims simple engine, the horsepower of which is about 100 at 275 revolutions per minute. Belted to this same engine, in tandem with the dynamo, is a four-pole differential booster, which is used to render the charging and discharging of the battery automatic.

There is another unit consisting of a Westinghouse 120-kilowatt multipolar 625 R. P. M. generator belted to a vertical 14 and 24 by 14 Westinghouse com-

pound engine of 200 horse-power capacity. This generator is only used on rare occasions, when the load is unusually heavy, as on holidays, etc. The same engine which operates this generator is also belted to one of the alternators for incandescent lighting.

The battery consists of 262 "Type F-9" chloride accumulator cells, each cell comprised of nine plates 10½ inches square. On full charge the battery has a maximum rated capacity of 160 amperes for short periods, though, as a matter of fact, it is often called upon to discharge at a considerably higher rate.

During the Summer season the cars are run on 12-minute schedule in town, and 24 to 28-minute in the country, week days, and a 12-minute schedule through on Sundays.

The results obtained are: Remarkable constancy of load, increased economy, simplicity of operation, shutting down of the small engine suddenly from some mishap, the battery carrying the entire load for the 8 or 10 minutes necessary to get the other unit into operation; running a car for some special occasion late at night with the generator shut down and the battery thrown across the line.

The battery has given no trouble since its installation and the daily labor for its care does not average more than one-half hour. In fact, about all the work required is that of taking voltmeter and hydrometer readings upon the individual cells once each week.

At this point a recess was taken until 2.30 P. M.

The first paper of the afternoon session was entitled "The Storage Battery," by Thomas Henning, superintendent of the power house of the Buffalo Railway Company. This was followed by a description of the Rochester & Sodus Bay Railroad, by T. J. Nicholls, vice-president of the Rochester Railway Company, Rochester, N. Y.

"Tests of the Buffalo Railway Power House," was the subject of a paper by Professor Norris, Cornell University, Ithaca, N. Y.

At 4 P. M. an adjournment was taken and the delegates and guests were taken in special cars of the Buffalo Railway Company to the Pan-American Exposition Grounds, after which a visit was made to the transforming stations and storage battery plants of the Buffalo Railway Company, where alternating current at 11,000 volts is stepped down and transformed to 550 volts direct current.

At 8 P. M the annual dinner was held at the Ellicott Club.

WEDNESDAY, SEPTEMBER 19.

President Rogers called the meeting to order at 10 A. M.

A paper on "Precision of Steam Power Making," by A. S. Mann, engineering department, Metropolitan Street Railway Company, was read by the secretary in the absence of the author. The point made was that definite results in the making of steam power could be attained only by actual measurement of the several factors involved, thus reducing operation to a mechanical certainty and eliminating from the problem the errors of what was known as "best judgment," and which varied as much as 10 per cent.

A paper on "Compressed Air Motors," by H. H. Cook, of New York, was in the absence of the author read by Mr. H. E. Himely, secretary-treasurer of the Compressed Air Company. This paper referred to the rapid progress made in the application of compressed air, which was made possible by the similarity of its application to that of steam, many instances being recorded in which boilers charged with compressed air had operated engines, and one instance in which a locomotive so charged was run about railroad yards experimentally for switching. These motors of American make were pronounced by foreigners as well as by Americans to be far superior to those of European make. Cars operated in Chicago, during a period of six months, consumed an average of 409 cubic feet of free air per car-mile. The cost of maintenance of these motors is much less than that of the ordinary steam engine, as there is no boiler to be cared for. Figures which had been furnished by the most responsible builders of air compressers in this country, estimating on a volume of 6,800 cubic feet of free air per minute, which would be sufficient to operate 100 cars, showed that two and eight-tenths cents would compress 1,000 cubic feet of free air, 2,000 pounds pressure. Among the advantages of a system of independent motors were the ability to do away with reliance upon the power plant, after the motors were once charged, and always to finish a run to any given point; dispensing with out-door construction; opportunity for charging cars and for storing in the power house during slack hours; spring supported motors removed the jar and prolonged the life of the roadbed. Low first cost of plant and of maintenance and opportunity for making repairs and adjustment without stopping operation of cars; freedom from liability of delay in transit from snow, ice or sleet.

Mr. Himely was asked by one of the delegates whether the reciprocating action of the motors in question did not introduce one of the evils which steam railroad men were hoping to obviate in changing from steam to electricity, and as to whether any attempt had been made to apply compressed air to rotary motors, to do away with the reciprocating action.

Mr. Himely replied that up to the present time rotary engines had not been perfected so as to be operated successfully where economy was the desideratum.

"Practical Experience in the Operation of Combined Public Franchises by One Company; its Advantages to the Public and the Corporation," was the text of a paper by C. E. Uebelacker, of the Elmira Municipal Improvement Company, Elmira, N. Y.

In the absence of the writer of this paper it was read by the secretary. The conclusion reached by the author was that when companies previously well managed were combined the advantages of economy lay not so much in broad sweeping reductions as in attention to the smaller details of combined organization; not so much in actually reducing the whole amount of labor required to accomplish the combined result as in the economical division of that labor, the use of the whole instead of a part of each employee's time, and the assigning similar work in different departments to the same employee.

Mr. Fenner, of Fredonia, N. Y., stated that the combination of the several plants for lighting and power in that town made it possible to convert into a profitable concern what under separate operation would be necessarily carried on at a loss.

The president read a letter from Mr. Charles R. Huntley, of the Buffalo General Electric Company, extending the privilege of its station to the convention, and on motion the invitation was accepted conditional upon there being time to visit the plant.

The order of "Topics for General Discussion" was then taken up, and Mr. Nichols of Rochester explained the "Repair Shop Methods," adopted in the plant there, one of whose features was an inventory book placed in the hands of all employees giving a specific number to every part in use to the number of about 2,500; all purchases, without exception, were made on written order entered with the purchasing agent, and a daily report was made out showing in detail every article bought or sold.

Mr. A. C. Tully, purchasing agent of the Metropolitan Street Railway Company, New York, stated that several years ago they had adopted the system of numbering each requisition consecutively.

In reply to Mr. Danforth, of the Buffalo Railway Company, Mr. Tully said that distribution reports were made to the auditor once a month.

Mr. Danforth said that the Buffalo Railway Company had changed from weekly to monthly reports this year, with a consequent reduction of labor in the store room. They used a separate set of job numbers for mechanical, track and job departments. Accounts were kept by the card system, admitting of immediate statements when desired.

Under the head of "Selection and Management of Employees, and Methods for Increasing their Efficiency by Benefit Associations and Other Means," the discussion was deviated somewhat to the more particular consideration of standard rules. The president asked Mr. Vreeland, of the Metropolitan Street Railway Company to discuss the latter phase of the subject.

Mr. Vreeland thought it would be useless to attempt in the few minutes remaining to consider the question intelligibly. He criticised the State Association for not giving more attention to the business coming before its conventions and urged that a standing committee be appointed on the question of uniform rules. Such a committee had existed since 1870 in the Railway Superintend-

ents' Association. The executive committee of the State Association worked hard and faithfully, and it was unfair that effort of this kind should be met by a beggarly array of empty chairs in the conventions. The executive committee had never had a meeting but that Mr. Nichols, of Rochester; Mr. Ely, of Buffalo; Mr. Rogers, of Binghamton, and the other members had come to New York to attend it, even when they were engaged in large construction work at home and could barely afford the time.

J. P. E. Clark, general manager of the Binghamton Street Railway Company, moved that the president divide this topic into subdivisions to be suggested by Mr. Vreeland, and that then the president allot to the presidents of different railroads throughout the state, according to geographical location, etc., such divisions as he thought most applicable, and that these be discussed under their respective heads at the next meeting.

J. W. Cole, manager West Side Railroad, Elmira, said that he understood that some recent legal decisions held that paving ordinances calling for "two feet outside of the rails" meant four feet in all, and asked for the understanding of delegates on that question. Mr. Nicholls said that in Rochester it meant two feet on each side of the track. Another delegate stated that in a suit in which the Cortland & Homer Traction Company had been involved a decision on this question rendered last week held that "two feet" meant two feet on each side of the track.

A discussion on snow plows ensued in which the practice of the Buffalo Railway Company and the Metropolitan Railway Company were outlined. One of the delegates called attention to the trouble met with in snow plows because the angle of the shear interfered, when there was ice and snow on the track, with keeping the front wheels on the rails. He had received a pamphlet describing a one and one-eighth inch flange with a groove cut in it which groove, it was claimed, in running over the rail cut out the ice in sections. He asked whether any one had had experience with such a device, but no one present could offer any information on the subject.

President Rogers said he wished to corroborate what Mr. Vreeland had said as to the work of the executive committee and joined in urging close attention to the business of the conventions. He suggested that very soon after the present meeting members should take up the different questions they wished discussed next year and send the topics in to the secretary, and the executive committee at its next meeting would take them up and prepare some plan for their discussion and for continued study from year to year of such subjects as required it.

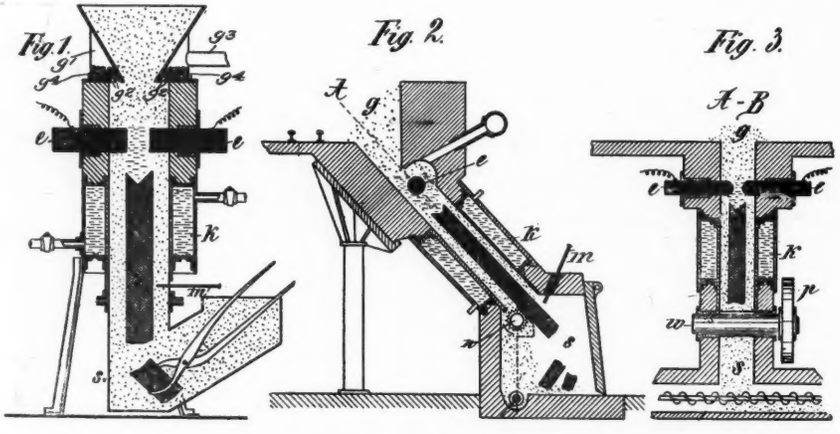
A number of letters and telegrams of regret were directed to be published without reading owing to the limited time at disposal.

The nominating committee, consisting of W. W. Cole, J. C. Brackenridge and H. S. Cooper, then presented the following report: President, G. Tracey Rogers, Binghamton; 1st vice-president, John Boyle, Utica; 2d vice-president, Edward G. Connette, Syracuse; secretary-treasurer, Henry A. Robinson, New York; executive committee, G. Tracey Rogers; Clinton L. Rossiter, W. Caryl Ely, H. H. Vreeland, T. J. Nicholls.

On motion the secretary cast the ballot of the convention for the gentlemen named, and they were declared duly elected. Mr. Nicholls invited the association to meet at Rochester in 1901, and on motion of Mr. Hasbrouck, of New York, the invitation was accepted. The convention then adjourned.

Recent Electrical Patents

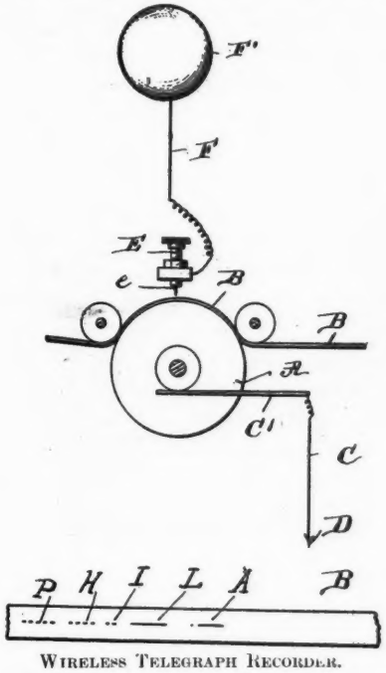
A recent invention in electric furnaces has been patented in this country by Wilhelm Borchers, of Aix-La-Chapelle, Germany. In the manufacture of calcium carbide and other products in an electric furnace requiring high temperatures the following difficulties have been met with: The mixture to be heated partly escapes decomposition when passing the region of the electric current, while another part is whirled out of the furnace with the gases arising during the electrochemical and thermochemical reactions. That part of the furnace charge which passes the electric-heating region undecomposed, together with a part of the manufactured product, will in many cases suffer damage by combustion, because it can not be prevented from leaving the furnace in too hot a condition. By this invention it is not intended to avoid a moderate part of the furnace charge passing the electric-heating region undecomposed, because by allowing a part of the furnace charge to pass the furnace undecomposed this part will not only help to protect the furnace walls against the action of the electrically heated products, but it will also greatly help in keeping up the necessary isolations; yet all other difficulties enumerated above will be done away with. In carrying out the idea the usual electric furnace is provided with a feeding hopper and electrodes. The lower portion of the furnace, however, is surrounded by a water jacket through which cold water is continuously passed. This jacket cools the products of the furnace as well as the undecomposed portion of the charge, and prevents such losses as are unavoidable when the products of the electric furnace leave the furnace hot as they are and come into contact with air. This is not only important for the ready product, but especially for the undecomposed part of the furnace charge, which in most cases consists of oxides and carbon. Coming out too hot the carbon will catch fire and burn away from the mixture, which in order to be used again will have to be mixed with a fresh portion of carbon before being returned to the furnace. As the undecomposed part of the furnace charge comes out cool, it can immediately be returned to the furnace together with fresh charges. The chief product itself will not suffer the slightest deterioration if after completion of the originating reaction it is sufficiently cooled inside the furnace.



IMPROVED ELECTRIC FURNACE.

Improvements in wireless telegraphy are being made rapidly, as is evidenced by the recent patent to Mr. Isidor Kitsee, of Philadelphia, Pa., who has designed means for recording messages with the aid of a chemically prepared paper. As is well known in telegraphy, a metallic drum is used on which the prepared paper rests, and this drum is in electrical connection with the ground, while the conducting stylus, resting on the paper, is in electrical connection with the line from which the messages are sent. Both line as well as ground connection are therefore connect-

ed with each other through the interposition of the moist chemical paper. This electrical contact is a necessity, and the recorder would not work, if, between the stylus and the paper, a non-conducting material, such for instance, as mica, glass, or air is interposed. In experimenting with space telegraphy, the inventor endeavored to make use of this chemical recorder in the usual manner, but found that no matter how far or near the sending station was placed from the receiving station the air transmitted electric impulses would not leave any trace on the paper if the stylus were brought into electrical connection with the paper resting on the conducting drum connected to the ground. After testing different arrangements, he discovered that it was necessary to introduce an air gap and allow the current to discharge through same either in the form of a spark or silent discharge. He therefore constructed a device with the following arrangement: On the drum proper, which, as usual, is connected with the ground, was placed the chemically-prepared paper; but the stylus was replaced by an adjustable screw, the point of which was at a distance of about two millimetres from the paper. Under this condition the apparatus worked satisfactorily. As a fluid, he used potassium iodide, potassium bromide, dextrine, and water in the proportion of one part of the dextrine, eight parts of iodide, 32 parts of bromide, and about 120 parts of water.



WIRELESS TELEGRAPH RECORDER.

One of the latest improvements in electric cars is a new manner of suspending the motor. Broadly speaking, it consists of a frame or cradle, having side bars which are attached at their end to cross bars. These cross bars are yieldingly suspended from extensions of the motor casings by means of coiled springs. The motors are sleeved upon their respective axles, and the ends opposite to the extensions are secured to the side bars of the cradle. By this construction the field magnets rest upon the side bars, but when the car is propelled in one direction, there is an increased tendency for the field magnet of one of the motors to press downward while the other is raised. As the motors are centred upon their respective car axles, they may turn slightly upon them, but such motion is opposed by the supporting springs of the cradle, and thus each motor is yieldingly supported. In this manner the greater portion of the weight of the motor is indirectly upon the car axles, and the entire weight is independent of the main truck frame, and thus does not interfere with the action of the springs supporting the body of the vehicle and relieves the truck from undue strain. The inventor of this improvement is George Gibbs, of Philadelphia, Pa.

Fig. 2

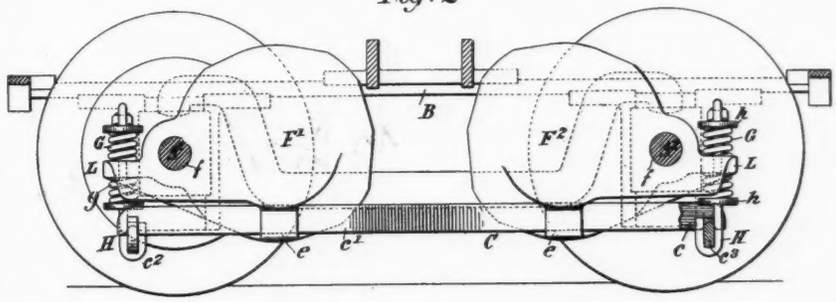
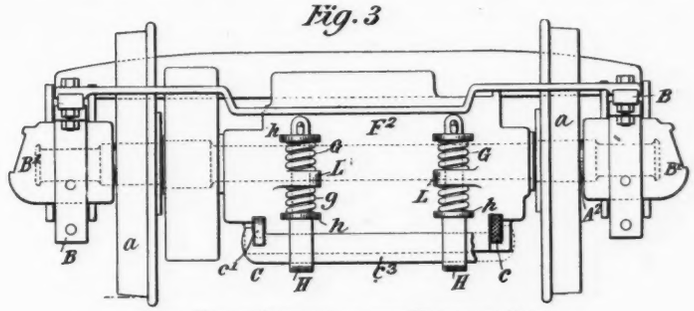


Fig. 3



NEW MOTOR SUSPENSION FOR ELECTRIC CARS.

Electric Tramway in Astrachan.

The Astrachan, Russia, electric tramway was opened to the public on June 11 last. It is a single-track network connecting the most important points of the town and harbor and some of the suburbs, its total length being 12½ miles. The electrical and mechanical equipment has been carried out by the St. Petersburg branch of Messrs. Siemens & Halske, and includes three 200-kilowatt sets, consisting of internal pole machines running at 200 revolutions per minute, driven through belting by compound steam engines. There is also a 50-kilowatt set for the station lighting. The tramway pressure is 500 volts. A feature of the station is that the three boilers, each of 2,150 square feet heating surface, are constructed for naphtha fuel. The ordinary Siemens sliding-bar system is employed on the line, there being two trolley wires of 8.2 millimetres diameter.

Controller Patent Suits.

The General Electric Company has filed a replication to the answer of the Boston Elevated Railway Company in the suits brought against the latter company for alleged infringement on patent of controllers, in the United States Circuit Court. The replication states that the answer of the elevated company is insufficient and it asks for a trial of the case on its merits.

Armour Institute.

The ELECTRICAL REVIEW has received from the Armour Institute of Technology, Chicago, its year book for 1900 and 1901. The book is carefully prepared and gives a description of the various courses of study provided. Professor Irwin John Macomber is the professor in charge of the electrical engineering course.

OBITUARY.

Mr. Israel A. Kelsey, president of the Winchester Avenue Railroad, of New Haven, Ct., and principal owner of several other street railways in Connecticut, Ohio and Cuba, died at the early age of 40, in New Haven, Ct., on September 24.

OLD-TIME TELEGRAPHERS.

JOINT MEETING WITH THE MILITARY TELEGRAPH CORPS, AT ST. PAUL.

The twentieth annual reunion of the Old-Time Telegraphers' Association and the United States Military Telegraph Corps was held at St. Paul, Minn., on September 18, 19 and 20. The meeting was held at Elks' Hall. About 300 members and their wives were present. There were but about 15 of the members of the Telegraph Corps present as these veterans of the civil war are not of an age to enjoy travel. Mayor Robert Smith, of St. Paul, welcomed the two associations and in token of the city's hospitality gave to Mr. James D. Reid, founder of the Old-Time Telegraphers, a large golden key. Mr. Reid presented to ex-President Hope, through Mr. S. A. Duncan, a Morse medallion to be worn by successive presidents of the Old-Time Telegraphers.

The courtesies of the Commercial Club were tendered to the two associations through President Pruden, and the telegraph companies offered the free use of their wires. Mr. John Brant, secretary and treasurer of the Old-Timers made a very satisfactory report and said that the Old-Timers had gained 177 members during the year. The executive committee and two special committees previously appointed were instructed to continue their study of the practicability of establishing a telegraph operators' home.

At the business meeting of the United States Military Telegraph Corps following that of the Old-Timers, Secretary J. E. Pettit, of Chicago, read the annual address of President William B. Wilson, of Philadelphia. Colonel Wilson was unavoidably absent owing to a recent death in his family. Colonel Wilson recommended in his address that a committee be appointed to confer with Senator Cushman K. Davis as to the introduction into Congress of a bill to give former military telegraph operators the same recognition now awarded to other veterans of the Civil War. Vice-president William L. Ives, of New York, appointed as this committee, Colonel Bliss, of Chicago; Colonel Wintrup, of Philadelphia, and Mr. Plum, of Chicago. A reception was held in the evening at the Hotel Ryan, and numerous excursions to points of interest about St. Paul were made.

The officers for the ensuing year of the Old-Time Telegraphers' Association are: President, F. E. McFarlane, president of the Bell Telephone Company, of Montreal; vice-president, J. E. Hutcheson, superintendent of the Ottawa Street Railway Company; secretary and treasurer, John Brant, of New York.

The officers of the United States Military Telegraph Corps are as follows: President, William B. Wilson, Philadelphia; vice-president, William L. Ives, of New York; secretary and treasurer, J. E. Pettit, of Chicago. All these gentlemen were re-elected.

Wall Street and the Electrical Stock Market.

For the first time during the year the influence of the approaching political campaign seems to have been reflected in the market this week. It is not likely, however, that the campaign is responsible for the movement in securities, but taken together with the threatening coal strike in Pennsylvania and the probability of closer money market conditions with the advance of the Autumn, sentiment has been affected to such a degree that heavy speculative liquidation has been brought about. It will be noticed that every stock on the list below has shown a considerable decline for the past week.

On the New York Stock Exchange, General Electric closed the week at 133 bid and 135 asked, showing a decline of 4 points for the week. Metropolitan Street Railway, of New York, closed at 146½ bid and 146¾ asked, a loss of 3 points for the week and 8½ points for two weeks. Third Avenue Railroad, of New York, closed at 108¾ bid and 109½ asked, showing a decline of 1¼ points in addition to that of 1 point noted last week. Brooklyn Rapid Transit closed at 50 bid and 50⅛ asked, indicating a decline of 2½ points for the week. Manhattan Railway, of New York, closed at 85 bid and 85⅜ asked, showing a decline of 3 points for the week.

On the Boston exchange, American Telephone and Telegraph closed at 137 bid and 138½ asked, showing a decline of 5 points. Erie Telephone closed at 96 bid and no asked price, showing a decline of 1 point in the bid price.

On the Philadelphia exchange, Electric Storage Battery was not quoted. Electric Company of America closed at 8 bid and 8¼ asked, indicating a loss of ¾ point. Union Traction closed at 30¼ bid and 30⅜ asked, a loss of 4⅜ points for the week, or 6½ points for the last two weeks.

On the curb, or outside market, in New York, Electric Vehicle closed at 17 bid and 20 asked, indicating a loss of 4 points for the week. Electric Boat closed at 15 bid and 19 asked, showing a loss of 1 point for the week.

Wall street, September 22.

An Electromobile Call.

[From the Cincinnati Commercial Tribune.]

There's a story being told at the expense of a well-known man who calls frequently upon an equally well-known young woman who is summering at Arlington, near the Country Club, at Columbus, Ohio.

The gentleman, so the story goes, engaged an electric automobile for the trip one afternoon last week, and, armed with a new book, a box of candy and a bunch of roses, went speeding out Fifth avenue for a long afternoon visit.

Just as the turn was made on the road leading toward the club the manipulator of the automobile discovered that some trifling disarrangement of the brake would prevent his stopping the machine. It sped along notwithstanding the call of the passenger to stop at the first house on the right.

Finally the motorman was forced to confess that he could not stop until the electric charge in the storage battery had exhausted itself.

That seemed funny enough for the first trip or two around the block, but riding about in a circle under the circumstances got exceedingly monotonous after a while.

Then the young woman, it is said, became curious and was at a loss to understand why her caller preferred to ride aimlessly around in that fashion. She went to the front door and down the road in answer to the gentleman's signal.

He explained the best he could as the automobile flew past, and after a half-dozen more turns she began to understand the situation.

It seems the battery had two hours more to run, and if it all ran out at Arlington there would be no way of getting the machine to town. Then they arranged a sort of railroad station mail catcher plan and the gentleman passed out the book, then the candy, and finally the roses to the young woman as the vehicle whizzed past her.

It took a trip for each article and a few more trips to say goodby, when they were warned by the operator that he must start for town or risk being stranded somewhere without motive power.

A few farewell waves, and amid the amused shouts and laughter of the Arlington resorters, who had gathered by this time, the disobliging and obstreperous machine disappeared over the hill toward town.

MINERAL CITY, OHIO—The Mineral City Home Telephone Company has been incorporated with a capital of $12,000. G. J. Mackley, T. E. Wilson and others are the incorporators.

The Electric Staircases of the New York Elevated Railway System.

At the Fifty-ninth street station of the Third avenue line of the Manhattan Railway Company, in New York city, there has just been installed, as a preliminary test, an electric staircase or inclined elevator as it is called by the maker, the Reno Inclined Elevator Company, New York city. Similar apparatus have been put in a number of the large department stores in New York, Philadelphia and other cities, and have also achieved considerable success at the Paris Exposition. Fig. 1 illustrates the elevator in position at the station, and Fig. 2 is a section showing how the moving platform ends at its upper and lower extremities. The hand rail, of course, moves along with the inclined floor of the apparatus, and, at the same speed so that the passenger simply steps on the moving incline, resting his hand on the hand rail, and is carried at a moderate rate of speed to the upper or lower floor.

FIG. 1.—ELECTRIC STAIRCASE INSTALLED FOR THE MANHATTAN RAILWAY COMPANY AT FIFTY-NINTH STREET AND THIRD AVENUE, NEW YORK CITY.

The surface of the incline consists of a series of shallow longitudinal rubber covered ridges, which, at the top, pass between the prongs of a comb-shaped landing, as shown in Fig. 2. In this way the passenger is slid out upon the landing without danger of anything, such as a woman's dress, being caught, so perfect is this action. It is claimed by the manufacturer that even cotton waste will not catch at the head of the incline. At present there is only one elevator in use on the system of the Manhattan Railway Company, that being the vertical elevator which goes up about half way to the level of the highest station, at One Hundred and Sixteenth street and Eighth avenue. It is claimed that the average New Yorker climbs about 20,000 feet a year up the elevated stairways. The proposed elevators will have a capacity of 3,000 passengers each per hour. Small electric motors will furnish the power requisite for their operation.

The Manhattan Railway Company is also installing at the Twenty-third street station of the Sixth avenue line an "escalator" manufactured by the Otis Elevator Company. This instead of being a moving inclined platform, is a moving stairway, a series of steps moving upward. A passenger may stand on a step and be carried up, or, if he desires to move faster, he can walk constantly upward as on an ordinary stairway and thus gain speed.

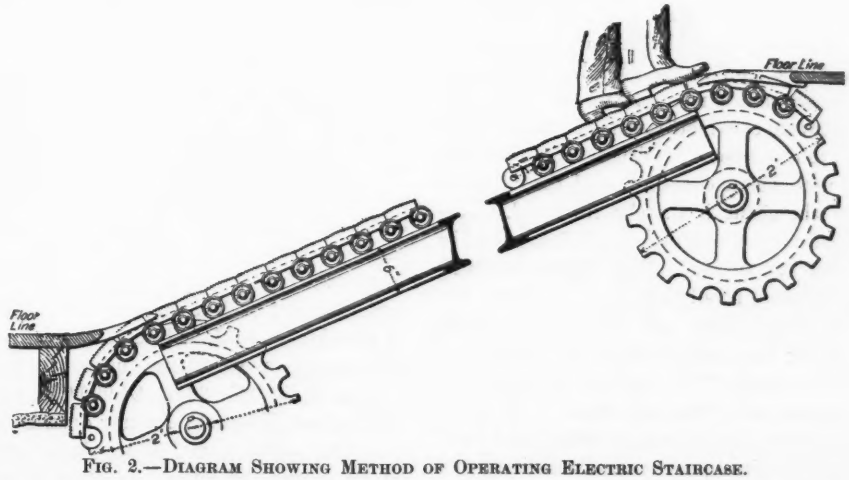


FIG. 2.—DIAGRAM SHOWING METHOD OF OPERATING ELECTRIC STAIRCASE.

As predicted some time ago it now seems certain that the Herkimer County Light and Power Company will secure the valuable Dolgeville, N. Y., electric plant. This plant is in the hands of Receiver Feeter, and the Herkimer County Company has recently purchased a majority of the bonds and has petitioned to have the plant sold under mortgage foreclosure sale. They will undoubtedly bid it in at the sale. This will give the company a monopoly on all the lighting plants in the county. The Dolgeville company has poles strung to bring electric power to Little Falls.

Refining Copper from Solutions Containing Antimony.

A new process of refining copper from solutions containing antimony is proposed by Messrs. Frank Klepetko and John T. Morrow, of Great Falls, Mont. The invention has for one of its principal objects the electrolytic purification of copper upon a large scale. The present process used for this purpose at some of the largest copper-refining works in this country employs an electrolyte of sulphate of copper, sulphuric acid and water, in which the impure copper is immersed and electrically connected as anode, while a thin plate of pure copper is used for cathode. Antimony, which is objectionable in copper for electrical conductors, is usually present in the impure anodes to a considerable degree, together with many other impurities, and as the copper is transferred electrolytically from anode to cathode the antimony and certain other of the impurities go into the solution. At first a lower oxide of antimony (Sb_2O_3) is probably formed, and later as the antimony accumulates in the solution the higher oxide Sb_2O_5 forms and produces an objectionable precipitate on the cathode. Moreover, the surface of the copper cathode becomes oxidized in spots. The purer copper as it deposits upon this becomes in turn spotted. In this manner, especially at high current density, the copper formed upon the cathodes is loose, sandy, or lumpy, and it lacks the high purity desired. The present invention rests upon the discovery that if certain organic substances, such as wood-teas, are added to the electrolyte in moderate proportions, preferably about one or two per centum, by weight, of electrolyte, the objections enumerated are overcome to a great extent, and the character of the copper deposited at the cathode is materially changed and improved. It is smoother, denser and purer. Fewer short circuits between electrodes occur, because of the tougher, smoother, denser and more coherent metal deposited, and the efficiency of the plant is thereby increased. Furthermore, much damage and loss by the breaking or crumbling during shipping and handling of the copper is saved, and the conductivity and desirability of the copper for electric wires and other uses is increased. The manner in which the organic substances act seems to be by reducing action, which prevents the formation of the higher oxide of antimony and permits the accumulation of antimony in the solution to a very much greater extent without either its presence or the oxidizing of the cathode giving serious trouble. The wood-tea may be prepared by soaking wood in water highly heated by steam. The amount added may vary very greatly, and the proportions mentioned are merely those which have been found preferable to use with electrolytic solutions consisting of 12 parts, by weight, commercial sulphuric acid, 14 parts sulphate of copper, and 74 parts water.

A New Way to Increase American Exports.

Mr. Simon W. Hanauer, United States vice-consul-general, at Frankfort, Germany, writes as follows:

"In my replies to inquiries from manufacturers in our country as to how to gain foreign markets for their products, as also in my reports to the department, I have impressed upon our exporters the necessity of personally studying the wants of foreign markets; of meeting the usual terms of credit, time and place of delivery, standard of weight and measure, of knowing the language of customers, of combination in foreign trade, etc.

"There is another mode which promises splendid returns for those employing it, which will also stimulate our export trade. This consists in establishing American department stores in the large European cities.

"In Germany and most other continental countries, there are large retail warehouses and stores which sell different lines of dry goods and clothing for female wear. Department stores on the order of our own, containing almost everything for human needs, are hardly known here. Consequently one finds in an European city hundreds of retail stores, carrying small stocks and selling articles at high prices. I think department stores would find conditions more favorable here than at home, in amount of sales and return on the capital invested; but the importance of the plan consists in the immense impetus they would give to the sale of American specialties—household articles of all kinds, clothing, kitchen and ironware, small machines, tools and instruments, toys, carriages and vehicles, office and dwelling furniture, fruits and meal, etc. I am confident that such a concern established in Frankfort could, within a few years, sell American specialties alone to an amount of $3,000,000 to $4,000,000 annually, and distribute further quantities by giving agencies to leading dealers of interior towns and cities. In shoes alone it could transact a large trade. Our manufacturers need then but offer their products to the home purchasing office, in order to do a foreign trade."

Electric Lighting

Galesburg, Ill., will own its own electric light system, a contract for one having been let at $33,425.

The finance committee of the McKeesport, Pa., council has inserted in a recent ordinance the sum of $50,000 for a municipal electric light plant.

An enlargement of the municipal electric light plant is contemplated by the city of Cumberland, Md. Sixty-five new lights and an additional engine and generator are to be added.

Plans are about to be begun for the new electric lighting plant at Vineland, N. J., which is to cost about $25,000. The money to cover cost of erecting building and completing same with proper machinery and equipment will be provided by the sale of bonds for that amount.

The work of stringing the wires for the purpose of transmitting electric power from the nearly completed plant at Trenton Falls to Utica, N. Y., begun Monday, September 24. The company will work about 30 men. About 700 poles will be required, some of which have already been distributed. It is understood that the company has sold a great part of the power which it is expected to generate and that there appears to be a market in Utica for all that can be produced.

It is expected that work on the new electric plant of the Glens Falls, N. Y., Gas and Electric Light Company will be far enough advanced by October 15 to permit the starting of the dynamos. As heretofore announced, A. W. Thompson has the contract for building the structures of the plant, which are to be of brick, with cement floors and roofs of iron and slate. The engine and dynamo room will be 65 by 55 feet, and the boiler room 55 by 43 feet. John Reilly has been awarded the contract for building the boilers.

It is proposed to erect an electric power plant at Belvidere, N. J., to use the water power of the Delaware River at Big Foul Rift, a few miles below Belvidere. Options have been secured on a number of farms adjoining the river. The plan is to furnish electric power for the lighting of Phillipsburg, Washington, Hackettstown, Belvidere and other nearby places. For nine months of the year it is estimated that the energy to be derived from the flow of water at the rift will give 5,000 horse-power. There is a fall of 23 feet in a little over a mile.

Electric Fire-Hose Signals.

Seconds at the beginning of a fight with a fire are worth hours later on, and every expert fireman knows very well that time gained at the outset is often of the most enormous value. Former Fire Chief Hugh Bonner, of New York city, remarked that the first five minutes of a fire were the critical part and in them was decided which way the balance of victory would lie in the fight with it. The elimination of delay has been the object of numerous inventions employing electricity in connection with the work of fire departments. The automatic electric system and the manually-operated electric system have replaced all other varieties of signaling an alarm of fire in civilized communities. A new invention, which is here illustrated, is intended to save several valuable seconds by putting the men at the nozzle of the hose in communication with the engine. One of the most serious of the small delays that may occur at a fire is in sending men forward and back between the hose men and the man at the engine to inform the engine man when to pump and when to cut water off. Often directions are shouted from some upper window and lost in the noise and confusion of the streets. It is to prevent this that the electric hose signal here illustrated has been brought out. By means of this device the man who handles the nozzle has only to press a button to be in communication with the engine man. The appliances are of the simplest. Fig. 1 illustrates a modern steam fire-engine equipped with the apparatus, the battery box and the bell being seen directly behind the driver's seat. Fig. 2 shows the battery and bell apparatus as located on the engine. This consists simply of several cells of dry battery in a box and a powerful electric bell attached to it. The circuit is completed through the hose and the couplings shown in Fig. 3. On the left-hand side of this illustration is shown the nozzle used between the play-pipe and hose and containing the push-button which is used to make the signals. The other two illustrations show the couplings which are used with the hose. Of course, the conductors have to be wired through the hose, and this can be done either with new or old hose.

The apparatus is manufactured by the National Electric Hose Signal Company, 38 Chardon street, Boston, Mass.

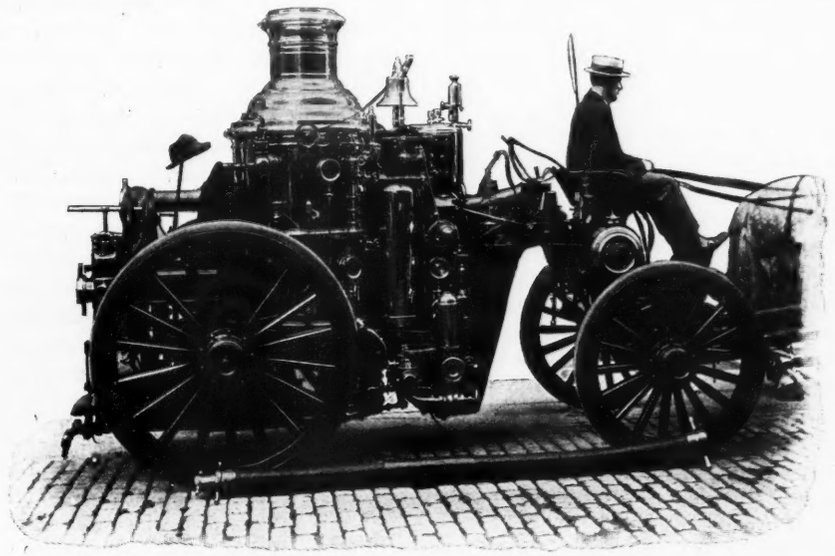


FIG. 1.—FIRE ENGINE EQUIPPED WITH ELECTRIC FIRE-HOSE SIGNAL APPARATUS.

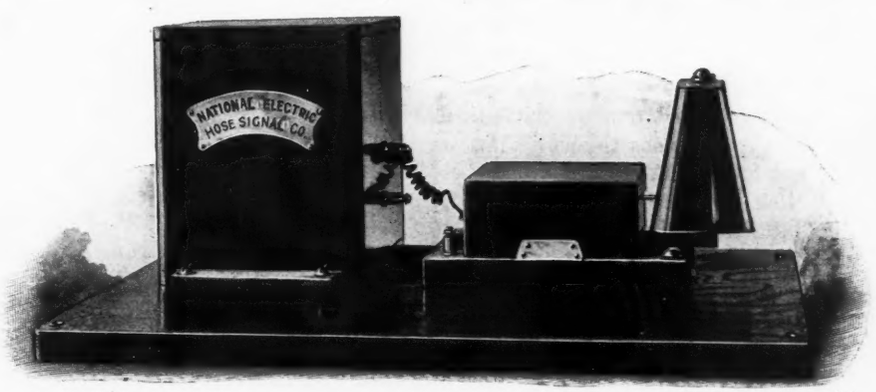


FIG. 2.—ELECTRIC FIRE-HOSE SIGNAL APPARATUS

FIG. 3.—NOZZLE AND COUPLINGS USED WITH ELECTRIC FIRE-HOSE SIGNALS.

Trade Prospects In South Africa.

Commenting on the trade prospects in South Africa, the *British and South African Gazette* says, in part: "The optimism that prevails among British manufacturers generally as to the great commercial future that is before South Africa when the war is over and British supremacy reigns supreme from the Cape to the Zambesi is highly refreshing, and is in marked contrast to the feeling of depression under which they have labored for the past 18 months. They argue that, if left to work out its own destiny undisturbed by the recurring troubles of the past few years, with settled and enlightened government, the expansion that must result by reason of South Africa's vast mineral wealth alone, irrespective of the other industries that will speedily open up, can not fail to result in a trade boom which will be unparalleled in the history of our commerce. Moreover, directly peace is declared, they say, the demand for goods of every description will be instantaneous, owing to the fact that stocks all round are at their very lowest ebb and will need immediate replenishing so soon as communication with the several centres is restored."

The Electric Railway Equipment Company, of New York, has closed contracts recently for several carloads of poles for export. One contract, it is said, will amount in value to $78,000, and another to $29,000.

Electric Railways

A company has been organized with a capital of $220,000, to build a trolley line from Penn Yan, N. Y., to Hammondsport.

A syndicate is making surveys for a trolley line through Perkiomen Valley, in Pennsylvania, beginning at Collegeville and running to the Lehigh River.

Contracts have been signed for the construction of a street railway line, to be known as the Alliance, Sebring & Salem, Ohio, Electric Railway. Work has already begun on the line.

The surveyors of the route for the proposed electric road between Alexandria Bay, N. Y., and Redwood have their estimates completed and work will be commenced on the construction of the road at once.

A resolution to compel the Brooklyn, N. Y., Rapid Transit Company to put its trolley wires underground was introduced the other day in the board of aldermen by Alderman Alt. It was referred to the committee on railroads.

An electric road from Detroit, Mich., to Bay City is among the possibilities of the near future. R. D. Currey, of Rochester, Mich., is one of the promoters of the line. It is proposed to build by way of Lapeer, Pontiac and Hadley.

The city council of Peru, Ind., has passed an ordinance granting a franchise to the Wabash River Traction Company for an interurban line between Wabash and Peru. Work will be begun at once, and Mr. Boyd, the projector, says that cars will be running over the line by May 1, 1901.

The county commissioners have granted a 25-year franchise to the Dayton, Ohio, & Lebanon Traction Company for electric cars. The promoters are: W. P. Sunderland, G. P. Wolf, J. E. Lowes and others. All are wealthy. The road is to be completed soon, and is the ninth electric traction line coming into Dayton.

A trolley line that will connect Rochester, N. Y., with Buffalo by way of the famous Ridge Road in the northern section of Niagara County is believed to be assured. Rights-of-way have been secured. Branch lines will run to Medina and Albion. It is promised this road will be in operation early next Summer.

The Whitehall & Granville Railroad Company, of Washington County, N. Y., a street surface railroad to be operated by electricity or other power except locomotive, capital, $250,000, has been chartered. It will run from Whitehall to Granville, a distance of about 14½ miles. Several branches are to be built and maintained to connect with the Delaware & Hudson tracks, making in all a total mileage of 20½ miles.

Articles of incorporation have been filed by the Hartford, Ky., & Beaver Dam Railroad Company and a survey of the line will at once be made. It is the intention of the promoters to establish an electric plant which will furnish force sufficient for the movement of cars and also light the towns by electricity. Now that the enterprise is established on a firm basis, there is every reason to believe that the work will go forward at once, and it will only be a few months until the road will be built and in operation.

The Columbus Street Railway Company has just made a proposition for a renewal of its blanket franchises for 25 years. It proposes to pay a cash sum of $40,000, two per cent of its gross receipts at first, gradually increasing as the gross receipts increase, until five per cent is reached. As to tickets, it proposes to sell 28 tickets for $1, good at any time and for transfers to all its lines, and, as an experiment, to sell 32 tickets for $1 for the use of working men, morning and evening. This is to be tried for 90 days, but the company is not to be held to it if the receipts show a falling off as the result.

The next few days will probably see the completion of plans for the construction and consolidation of a system of 120 miles of suburban lines connecting Manchester, Liverpool, Bolton and a score of smaller towns in the most populous district of Northern England. This project is in the hands of Tom and Albert Johnson, of Brooklyn, N. Y. All kinds of rumors are current regarding the coming of American enterprise and capital to relieve London's congested traffic. That the metropolis is far behind provincial centres in many things that go to make up a modern city is beginning to be realized by Englishmen as well as by Americans, and a demand is arising for new blood—American or otherwise—capable of solving transit problems.

A telegram from Trenton, N. J., says: The same syndicate of local capitalists who, headed by Wilbur F. Sadler, Jr., recently undertook an enterprise to connect Harrisburg with New York city, has just completed a most important deal in this direction. The syndicate, together with several Philadelphia bankers and brokers, took up the controlling stock in the Doylestown, Newtown & Bristol Company, and will hereafter run electric cars between Allentown, Pa., and Willow Grove, and also direct from Trenton to the Quaker City. It was for the purpose of bringing Morrisville into communication with Newtown and Doylestown that the Sadler people recently began to build the line from Allentown to Yardley. With the completion of this branch of the system the syndicate will have joined all of the larger towns in Bucks County with Trenton, and will also have in its undisputed control a circuit of eight big boroughs and several thrifty Pennsylvania townships, all of which will be at once connected with Philadelphia and the Jersey capital.

The Heim Brothers, who own the East Side Electric Railway in Kansas City, Mo., are planning extensions which may run to Independence and furnish connections to Excelsior Springs. They were recently granted a franchise from the eastern terminus of their present lines, in the East Bottoms, to the eastern city limits. This is part of a plan to reach the Chicago, Milwaukee & St. Paul Railway Company's bridge across the Missouri River. There is a plan well started for an electric line through Clay County, which is expected to result in the building of lines that will connect Excelsior Springs and Liberty with Kansas City before next Spring. The Heims are encouraging it and may put money into the venture. The Clay County people expect to cross the Milwaukee bridge and when they do the Heims' line will be at the Jackson County end. Talk of a line to Independence has not materialized, but a member of the company says that it is now under consideration. There are factions in Independence disputing over the electric line now running there and the Heims believe they could get a good patronage if they should bring their line straight through and bring passengers to the city market.

Electrical Work in Havana.

The Havana Electric Railway Company is working hard laying new tracks on the four electric railway lines in the city of Havana. Nearly two-thirds of the old track has already been replaced by new rails. The work at the lower plant is in progress and the boilers are in course of erection. Nearly all of the car trucks and about 20 of the car bodies have been received.

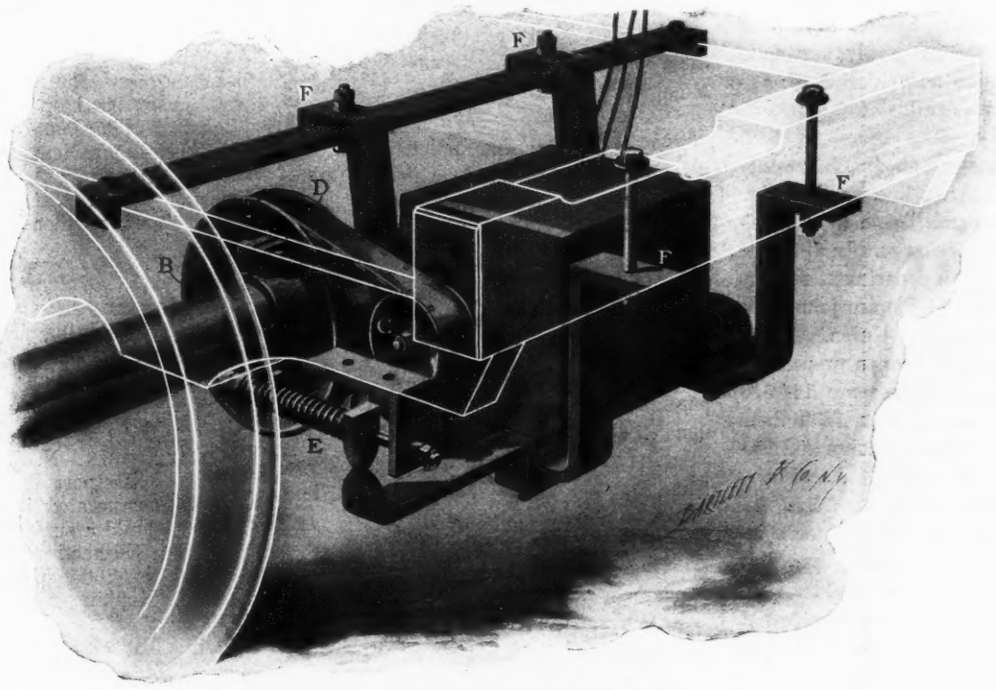
Train Lighting from the Car Axle.

The application of electricity to train lighting has been one of the most interesting developments of electrical illumination on account of the peculiar difficulty of installing electric lights in these vehicles and of properly regulating them when power is taken from the motion of the car itself.

In the illustration herewith is shown the generator of a new system which combines features of merit of several of the older systems, its owner, the Consolidated Railway Electric Lighting and Equipment Company, of New York, having absorbed all of the various companies that for several years past have been engaged in bringing train lighting from the car axle to a point of perfection. The illustration well shows how the mechanism is mounted upon the axle of the car and swung from the truck. It is completely encased and protected from dust and dirt and occupies no space within the car itself. The dynamo is driven from the axle, and at a speed of 15 miles per hour operates the lights in the car direct. Below this speed, or when the car is standing still, the lights are fed from a storage battery, and above this speed the battery absorbs a proportionate amount of the energy of the dynamo constantly delivering to the lamps their normal voltage. A small motor is installed as part of the regulating mechanism, so connected that it throws resistance in and out of the field coils of the dynamos as the speed increases or diminishes. When the battery is charging resistance is used in the lamp circuit, since the electro-motive force developed by the generator under these circumstances would be too great to apply directly to the lamps. The whole operation of the regulator and of the dynamo is automatic, requiring no manipulation on the part of the train hands. The oiling of the apparatus is accomplished by automatic oilers with a capacity for several months. To prevent excessive overcharge of the storage battery, the power of the dynamo is generally proportioned with reference to the running time of the train so that the current generated is sufficient to supply the lamps for the car during an average run and keep the battery fully charged at all times and ready for an emergency.

The usual equipment of a car on this system ranges from 17 to 80 16-candle-power lights, and from two to eight electric fans, according to the character of the car.

In this system the connection between the driving axle and the armature shaft is made by means of what is called a flexible gear. This consists of an armored belt with V-shaped segments arranged on its inner side so as to permit of the use of a groove-faced pulley. With this mechanism it is claimed that the belt can not slip off and that curves of short radius can be rounded without danger. The pulley on the dynamo is made in two pieces with a spring on each side so that, when the car goes round a curve and the distance between centres tends to increase, the two parts of the driven pulley expand outwards and tend to maintain the same relative distance between the centres and the driving pulleys.



APPARATUS FOR TRAIN LIGHTING FROM THE CAR AXLE.

Cable Service at Pernambuco, Brazil.

United States Consul Edwin N. Gunsaulus writes from Pernambuco, Brazil, as follows: "This city now takes first rank as a cable station in South America, and has lately made material improvements in its submarine telegraphic service. It has no less than 10 cable lines to various parts of the world. There were formerly three cable companies here, but recently two of them were consolidated. The present companies are the Western Telegraph Company, Limited (English), and the South American Cable Company. The first named has a very complete system and is now finishing two or three lines to Brazilian ports. One of these is a through line to Para, another to Para touching local points, and still another to Rio de Janeiro. It now has distinct lines running to Para, Ceara, Rio and Bahia; two to St. Vincent, Cape Verde Islands, and one to Europe *via* Lisbon, Portugal. Several of these cables are duplexed, while another line to Rio will be triplicated to Montevideo. These lines are constructed according to the latest scientific improvements, and some of them have a carrying capacity of 200 letters a minute. The rate for messages from here to New York *via* Europe, is about $1.15 per word. The Western Company has 50 people constantly employed here as an office force. The South American Cable Line touches several South American points, going thence to the Canary Islands, Cadiz, Spain and Africa."

Views, News and Interviews

In November next year the Russian Government will become the owner of the telephonic networks established at St. Petersburg, Moscow, Warsaw, Odessa and Riga. The networks are now carried on by the Bell Telephone Company.

A writer in the *Revue Générale des Sciences* suggests the employment of calcium carbide as a deoxydant in foundry practice, the reagent being added to the metal before pouring. The results are improved by the addition of a metallic chloride. Aluminum bronze can, it is stated, be produced by gently heating a mixture of alumina and chloride of copper in contact with carbide of calcium.

In Japan the telegraph was first established in 1869, when a line was built between Yokohama and Tokyo by English engineers, says an exchange. In 1873 the government telegraph department was organized. In 1879 the Empire joined the International Telegraph Union. There are now 1,267 offices in Japan proper and 112 in Formosa, and there are 144,570 miles of line in service. In 1899 these lines transmitted 224,000 foreign and 15,275,623 domestic messages.

An invention has, it is said, been completed by which such things as "lost chords" are to be prevented. The London *Globe* makes the announcement that Mr. Vaughan Neale has completed an electrical machine which is to register extempore compositions upon the piano. The arrangement can be attached to any ordinary piano, and it is reported that the machine has taken down a tarentella played at the rate of 2,000 notes a minute. The attachment, it is stated, does not interfere with the touch.

The Marconi Wireless Telegraph Company has contracted to supply the British Admiralty with Marconi apparatus for 32 ships and stations. The test of efficiency which has to be satisfied is that instruments shall enable communication to be carried on between a fitted ship in Portsmouth harbor and a fitted ship at Portland, a distance of about 65 miles, with a good deal of land between, including the Dorsetshire Hills, making it about 90 miles by sea. A trial set of the apparatus successfully fulfilled the conditions a few days ago.

A curious fatal accident is reported from Washington, D. C. A colored man, employed in a saloon, went through a trap door into the cellar to tap a keg of beer. The man was very large and the trap door was quite small. Near the trap door an electric cable ran up the wall, and going through the hole the man came in contact with the cable and received a fatal shock. He fell into the cellar dead. Three hours elapsed during which time it seems not to have occurred to any one to have the current turned off. At the end of this time the bartender announced his intention of securing the keg of beer and passed through the trap door. Another man followed him, and as he reached the cellar his curiosity got the better of him and he deliberately put his hand on the cable to see if the current was still there. He also dropped to the floor dead.

Just retribution has fallen on a lad named David Pritchard, who has been amusing himself lately by throwing stones at telegraph wires and insulators in the Harewood End district of London, says an English contemporary. This is not the first time that the boy has got into trouble for the same offense, as he was let off last December on the understanding that his parents should punish him. The damage done consisted of the breaking of seven insulators, and if such damage were to continue it would be a constant source of annoyance to the telephone employees. After deliberating in private, the magistrate said the bench believed defendant to be guilty, and this was a thing that must be stopped. He was liable to a fine of £10 or three months' imprisonment, but they would be lenient, and hoped the defendant's father would look after him in the future. He would be fined £1, including costs. This verdict will probably help the father to look after his son, but we think a liberal application of the birch would have a more lasting effect on the boy himself.

American Institute of Electrical Engineers.

The one hundred and forty-sixth meeting will be held at 12 West Thirty-first street, New York city, Wednesday, September 26, at 8 P. M. A paper will be presented by Professor Henry S. Carhart, entitled "The Imperial Physico-Technical Institution in Charlottenburg." The author spent the last few months of 1899 at the Reichsanstalt as a scientific guest, and has thus been afforded an excellent opportunity for studying its practice.

Corporation News

MILWAUKEE, WIS.—The Cutler-Hammer Manufacturing Company, manufacturer of electric controlling devices, has increased its capital stock from $150,000 to $200,000.

HONEY GROVE, TEX.—The Honey Grove & Ragsdale Telephone Company, with principal office at Honey Grove, has been incorporated. Capital stock, $1,200; incorporated by: J. W. Underwood, P. M. Price and T. U. Cole.

EASTON, PA.—The Easton Power Company, Easton, Pa., has commenced suit for $75,000 against the Siemens & Halske Electric Company in the United States Circuit Court, at Chicago. Breach of contract is alleged in the bill of particulars.

SELMA, ALA.—The Selma Street Railway Company has been organized, with a capital stock of $50,000. The officers are: F. M. Abbott, president; B. Marion, secretary and treasurer; A. W. Hall, superintendent; A. D. Pitts, counsel. The stockholders are northern men.

SYRACUSE, N. Y.—The Archibald-Brady Company, of Syracuse, has been incorporated to construct street surface railroads, electric lighting plants, telephone, telegraph and gas plants. Capital, $50,000; directors: William K. Archibald, New York city; Paul T. Brady and Robert E. Drake, Syracuse.

ELIZABETHTOWN, N. Y.—The Elizabethtown & Westport Railway Company has been incorporated by the Secretary of State to build a surface road 10 miles long, from Elizabethtown to Westport. The capital is $200,000, and the directors are: G. P. Hopkins, M. S. Decker, John Willioughby, of New York, and A. Van Vechten, of Elizabeth, N. J.

HOOSICK FALLS, N. Y.—The Hoosick Falls Electric Company has been incorporated to furnish electric light and power. The company has a capital of $85,000, and the directors are: Willis E. Keaton and Ezra Tiffany, of Hoosick Falls; George W. Davenport, of Winchester, Mass.; Owen D. Young, of Cambridge, Mass., and Clarence N. Grey, of Boston.

CHARLESTON, S. C.—The American Duplex Telephone and Telegraph Company has been incorporated with a capital of $1,000,000 to do a general telegraph and telephone business. The incorporators are: J. E. Scraggs, E. L. Wood, C. R. Burdette, A. H. Wilson, Jr., J. E. Chilton, all of Charleston; Chilton, MacCorkle & Chilton, attorneys, Charleston.

GREENSBURG, IND.—The Greensburg Telephone Company has filed articles of incorporation with the Secretary of State. Capital stock, $50,000; the incorporators are: A. P. Bone, W. B. Hamilton and D. A. Myers. The company proposes the erection of a line and to operate in Decatur, Franklin, Rush, Shelby, Bartholomew, Jennings, Ripley and Dearborn counties.

A New Electromobile Delivery Wagon.

In the illustration herewith is shown a recently completed electromobile delivery wagon built by the Collins Electric Vehicle Company, Scranton, Pa., working under the patents of Mr. P. J. Collins, an electrical engineer of that city. The company is bringing out a new line of electromobiles possessing several novel features. The efforts of the company have been toward producing a light-weight, easy-running vehicle, with a long-running radius, thus obviating, as far as possible, the necessity for recharging batteries. The weight of the motor has been reduced to a minimum, combined with the highest efficiency and the controller and the various circuits have been designed to operate at the greatest economy in current consumption under all conditions. The running gear is especially ingenious and by means of it the forward and rear wheels may move vertically independently of each other in passing over obstacles, thus reducing the jolting, causing the vehicle to ride easier and preventing the destruction of the battery by jarring.

A New Electric Delivery Wagon.

Differential gears are used in the steering mechanism. The two armatures of the motor are connected independently to the rear wheels and vary in speed relatively to each other when the vehicle is steered around corners. The forward wheels are caused to turn mechanically on arcs of different radii by means of the steering lever. The forward wheels may be turned the maximum distance for steering by a short throw of the handle and the wheels are then locked owing to the peculiar construction of the forward axles and the steering lever. The wheels may be moved into any intermediate position and held by a slight effort on the part of the driver.

The vehicle illustrated weighs about 2,000 pounds complete with batteries and runs at a normal speed of 12 miles an hour. The manufacturers state that it will travel 60 miles over ordinary roads or city streets on a single charge of the batteries. The battery consists of 44 80-ampere-hour cells, having a maximum discharge capacity of 32 amperes. The vehicle shown is fitted with two motors and spur gearing. Another vehicle of the same type and size and running at 10 miles per hour, weighs only 1,800 pounds, is equipped with the Collins single motor with double armature and will travel 75 miles without recharging.

PERSONAL.

Mr. T. J. McTighe, the well-known electrical engineer, sailed for Europe on Saturday of last week. Mr. McTighe will spend about six weeks in London and other English cities.

American Electrical Works.

This company will retain its organization, property and officers as heretofore, and will continue business in the same way. The Washburn Wire Company has acquired an interest in the American Electrical Works, and the stockholders of the American Electrical Works have acquired a large interest in the Washburn Wire Company. The officers and directors in the two companies are:

American Electrical Works—Frank N. Phillips, president; E. Rowland Phillips, vice-president; C. H. Wagenseil, treasurer; C. R. Remington, Jr., secretary; Eugene F. Phillips, general manager; directors: Eugene F. Phillips, Chas. R. Remington, Jr., E. Rowland Phillips, Chas. G. Washburn, Edwin A. Smith, Frank N. Phillips, C. H. Wagenseil, John D. Curtis, Robert Winsor.

Washburn Wire Company—Chas. G. Washburn, president; Eugene F. Phillips, vice-president; Joseph Remick, treasurer; John D. Curtis, general manager; directors: Chas. G. Washburn, John D. Curtis, Eugene F. Phillips, Robert Winsor, Edwin A. Smith.

The works at Phillipsdale, R. I., will be greatly enlarged and equipped with a complete steel and iron wire plant, and with the output of the large factories at One Hundred and Eighteenth street and Harlem River, New York, owned by the companies, will give the best facilities for the production of bare and insulated copper wire, as well as steel and iron wire of all kinds.

The United States Government Cable Ship Burnside.

The army transport Burnside has been recently fitted out at the Morse Iron Works, Brooklyn, N. Y., as a cable ship for the exclusive use of the government. She is preparing to sail soon with a deep-sea cable to be laid in the Philippines. The Burnside has been completely overhauled and all the necessary cable appliances have been installed. Three large cable tanks have been built in her hold, each about 25 feet in diameter and 15 feet deep. Each tank has a capacity for 250 miles of cable. The cable will be laid under the supervision of Captain Squier, of the signal corps. The Burnside was formerly the Rita, one of the prize steamers captured from Spain during the late war. The Burnside will take the place of the cable-ship Hooker, which was wrecked on Corregidor Reef, near Manila, some time ago, and which was described and illustrated in the Electrical Review for April 26, 1899.

Industrial Notes

THE TELEPHONE MANUFACTURING COMPANY, Sumter, S. C., has been awarded the highest medal for telephone apparatus exhibited at the Paris Exposition.

THE AMERICAN BRIDGE COMPANY announces that Mr. August Ziesing has been appointed general western representative of the company, with headquarters at Chicago.

HARTWIG & MILLER, 258 Randolph street, Detroit, Mich., have issued a new price-list and circular of the Anthony boring tool used by wiremen in construction work.

THE BALL ENGINE COMPANY, Erie, Pa., has recently been awarded a gold medal by the Paris Exposition as builders of automatic engines particularly adapted for electrical service.

ROBERT L. McOUAT, successor to Varney & McOuat, Indianapolis, Ind., is agent for the Jandus arc lamps. This progressive electrical supply house also carries in stock Buckeye incandescent lamps.

THE ELECTRIC APPLIANCE COMPANY, Chicago, is calling attention to a letter from a customer, in which he stated, in reference to the Adams-Bagnall arc lamp: "It has not one part too few nor too many."

THE WESTERN ELECTRIC COMPANY, New York, is sending to its customers and friends a very neat card case, memorandum and pocket book combined. It is made of handsome Russia leather and is a valuable souvenir.

THE WARREN ELECTRIC MANUFACTURING COMPANY, Sandusky, O., has just received contracts for the new additions to the electric light plants at Whitewater, Wis., and Naperville, Ill., which include 210 kilowatts of its alternators.

GEORGE E. LINTON & COMPANY, Worcester, Mass., have reached the high-water mark in the sale of their well-known switches. They announce that they are sending out more switches and receiving more orders than ever before.

THE MOLONEY ELECTRIC COMPANY, St. Louis, Mo., maker of the Moloney transformer, has issued a bulletin particularly discussing the relation of transformers to the alternating-current series system of arc lighting which will be found of interest to central-station managers.

THE SPENCER ELECTRICAL COMPANY, 163 Greenwich street, New York, manufactures a line of telephones particularly adapted for interior and intercommunicating uses. Its system requires but one group of cells and one induction coil for the working of an equipment of 10 instruments.

THE AUTOMATIC SWITCH COMPANY, Baltimore, Md., manufactures special automatic rheostats for electric elevators in sizes ranging from one-half to 125 horsepower. This apparatus is adaptable for all character of work of this nature. The company issues a complete catalogue of starters and switches.

THE BURT MANUFACTURING COMPANY, of Akron, Ohio, has made some important shipments of its Cross oil filters on export orders in the past month. These orders came from Denmark, Sweden, Spain, France, England and Mexico. Notwithstanding the unsettled condition of Europe, the company's export business is steadily increasing.

ELECTRIC GAS LIGHTING COMPANY, 195 Devonshire street, Boston, Mass., is issuing a very handsome catalogue of its latest types of electrical apparatus. The catalogue is profusely illustrated showing half-tones of the different apparatus manufactured and for sale by this company, and also contains instructions concerning the use and care of the same.

"THE FOUR TRACK SERIES," published by the passenger department of the New York Central Railroad, New York city, comprises booklets of interest to people of all classes and in all lines of business. The booklets have become so popular that the New York Central Railroad has found it necessary to issue a catalogue of the "Four Track Series." A postage stamp sent to Mr. George H. Daniels, general passenger agent of the road, will secure a copy of the catalogue.

THE HARDY LAMP COMPANY, Pittsfield, Mass., manufacturer of the Hardy incandescent lamps, mentions that its system of maintaining the highest standard for these lamps is that after its own system of lamp making has been adhered to all lamps are subjected to a critical test as to efficiency, voltage, maintenance of candle-power and those lamps not accomplishing the standard are completely rejected, though they may not be totally valueless, and are given a label other than "Hardy" and sold through dealers under other names at a lower price.

THE AMERICAN BATTERY COMPOUND COMPANY, Chicago, manufacturer of "American Battery Compound," a battery salt of superior quality, has moved its office and factory from 31-33 South Canal street to more commodious quarters at 224-226 South Clinton street. This step was made necessary by the rapid growth of the firm's business, which was wholly beyond its expectations. The new factory has a capacity of 15,000 packages of compound per day, and the company is now in a position to fill all orders promptly and would like to correspond with supply houses, telephone exchanges and others now buying sal ammoniac.

THE ALLEN SOLDERING PASTE, made exclusively by the L. B. Allen Company, Incorporated, Chicago, is a most convenient and effective soldering flux. It is a well-known article, non-corrosive and useful in almost every branch of electrical work. The paste has attained a high degree of perfection, and is the result of careful preparation on the part of the manufacturers. The sales the company has made, the orders now booked and the constantly increasing demand demonstrate the merits of this article. It is put up in a neat case, air-tight and ready for use. This enterprising concern has a good article, well appreciated by the trade, and the future prospect for increased business is exceedingly bright.

THE STANLEY INSTRUMENT COMPANY, Great Barrington, Mass., has increased its facilities for the production of the Stanley wattmeter and with the present factory facilities will be very well able to care for the increasing demand for this type of apparatus. This wattmeter, made for alternating currents, which was illustrated and described in these columns some months ago at the time of completion is now being widely installed and is generally considered a technical and commercial success. In fact, the makers are so well satisfied with the operation of the instrument that it is now offered under a guarantee as to continued good performance for a term of three years and under conditions which relieve station managers of the care of meters in installations.

AGING OF TRANSFORMER IRON—The General Electric Company is distributing a 92-page pamphlet on the subject of "Aging of Transformer Iron," containing five important articles that have been issued regarding this subject, as follows: "The Aging of Transformer Iron," by Professor W. Elwell Goldsborough; "On Slow Changes in the Magnetic Permeability of Iron," by W. M. Mordey; "Effects of Prolonged Heating on the Magnetic Properties of Iron," by Mr. S. R. Roget, B. A.; "Hysteresis in Sheet Iron and Steel," by Mr. Arthur Hillyer Ford, and the "Aging of Transformer Steel," by J. A. Capp. This pamphlet is one that should be in the hands of every central-station manager, and will be furnished free of charge upon application to the General Electric Company, New York.

THE ANCHOR ELECTRIC COMPANY, 71 Federal street, Boston, Mass., has recently completed and thoroughly equipped its new factory at Somerville, Mass., where it will resume the manufacture of its well-known electrical appliances. No expense has been spared in making this new factory a most complete one. The latest modern machinery together with such appliances as will render the company able to quickly fill orders have been installed, and it has secured the services of highly skilled workmen. The Anchor Electric Company has been known for a number of years as the manufacturer and producer of a very high grade of electrical apparatus, and announces that it is now in a position to promptly fill and handle all orders sent in to it for such of their apparatus. The factory itself is considerably larger than the former one and more than twice the number of men are employed.

THE INGERSOLL-SERGEANT DRILL COMPANY, New York, through the manager of its Paris office, writes to the ELECTRICAL REVIEW as follows: "May I call your attention to the fact that the information published in some of the American papers with regard to the awards to American exhibitors at the Paris Exposition is incorrect in a number of instances. For some reason, the names of those receiving Grand Prix and Gold Medals were printed together, so that there was no way to distinguish between those receiving the highest and those receiving second place. May I ask you to help correct this mistake in our case. The Ingersoll-Sergeant Drill Company, of New York, received the only Grand Prix awarded to any American exhibitor for mining apparatus. It also received gold and silver medals, but reference to these was correctly made in the press articles mentioned."

E. B. LATHAM & COMPANY, 136 Liberty street, New York, manufacturers and dealers in electrical supplies and specialties, record a rapid and steady growth in their foreign trade. In addition to regular and frequent shipments to England, France, Germany, and to Cuba, Mexico, Brazil and Argentine, they have during the past few weeks supplied an electric power transmission plant for Mexico, large shipments of ceiling and desk fans for the Philippines and Java, and fans and miscellaneous supplies for Belgium, Egypt, South Africa, Australia, Ceylon, India, Siam, Hong Kong, Honolulu, Guatemala, Peru, British Guiana and Porto Rico. Their foreign business has, in fact, become of such importance as to warrant the organization of a special export department, and an arrangement has been made with Mr. E. F. Colyer, who is well known in the electrical export trade, to take charge of this branch. Mr. Colyer, who has for the past two years been manager of the New York office of the South American Electric Company, and who was formerly connected with the foreign department of the General Electric Company, the Mexican General Electric Company and the South American General Electric Supply Company, is especially qualified to give proper attention to the affairs of the export department, being thoroughly familiar with conditions governing in the field covered. He has traveled extensively, and in addition to speaking Spanish and French has a working knowledge of one or two other languages. Messrs. Latham & Company have recently issued a new catalogue, No. 17, illustrating telegraph and telephone instruments, bells, batteries and house wiring goods generally, which, with previous issues of No. 14, electric light and power supplies, and No. 16, railway supplies, cover the field of electrical enterprise pretty thoroughly.